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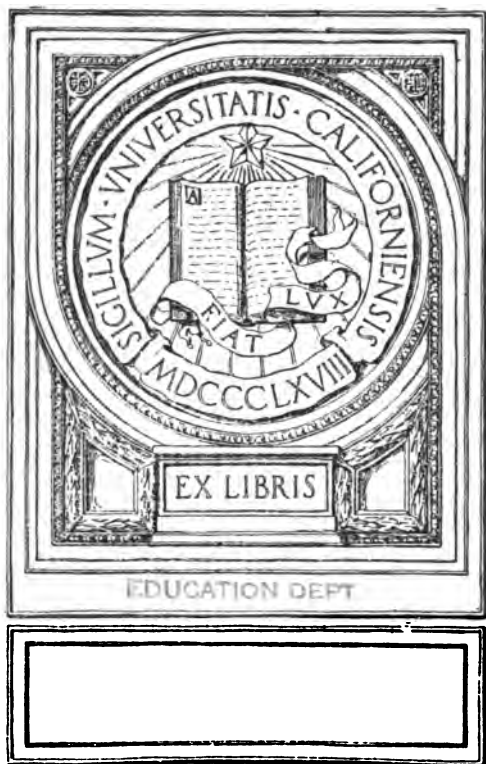
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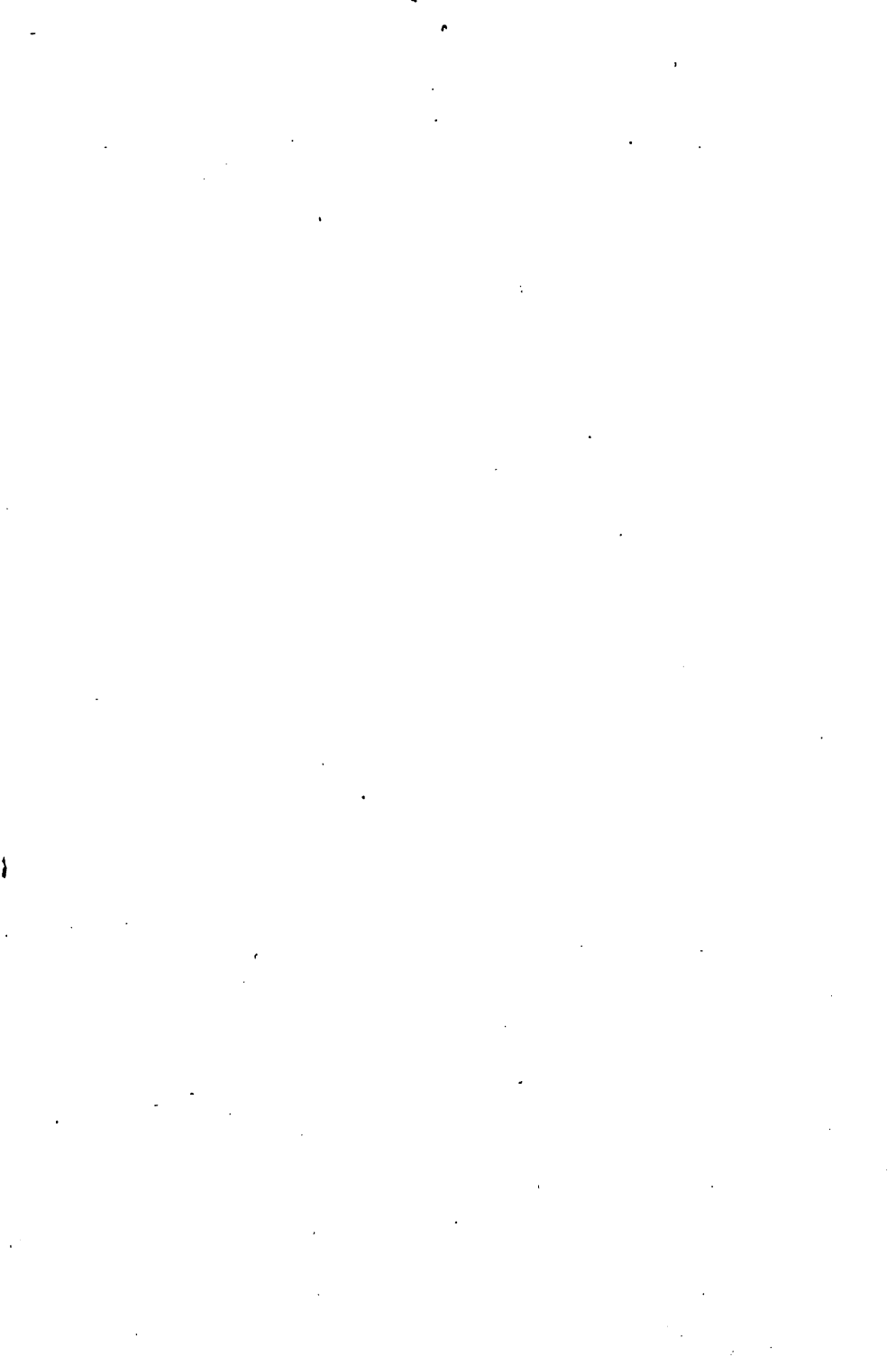
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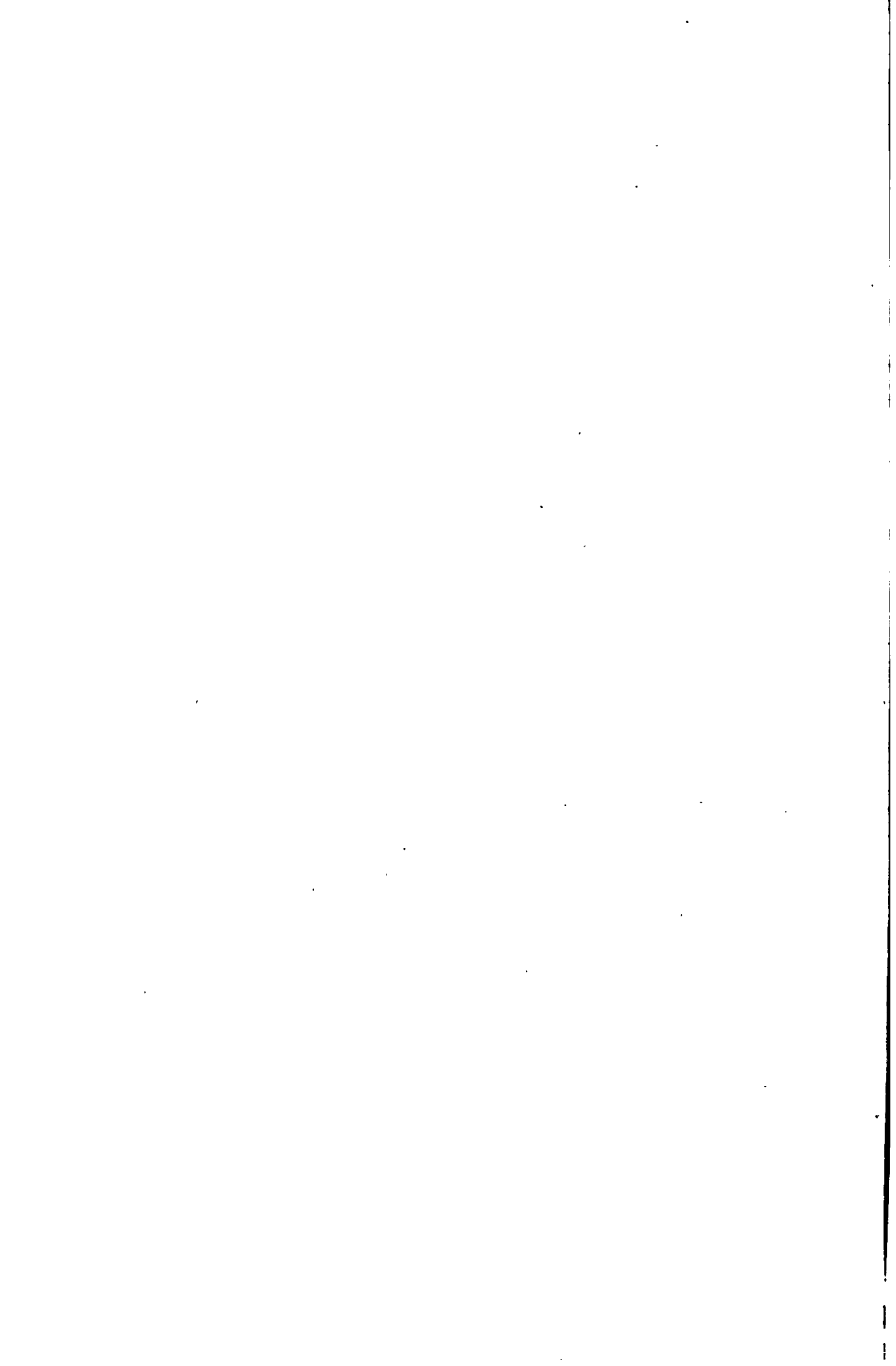
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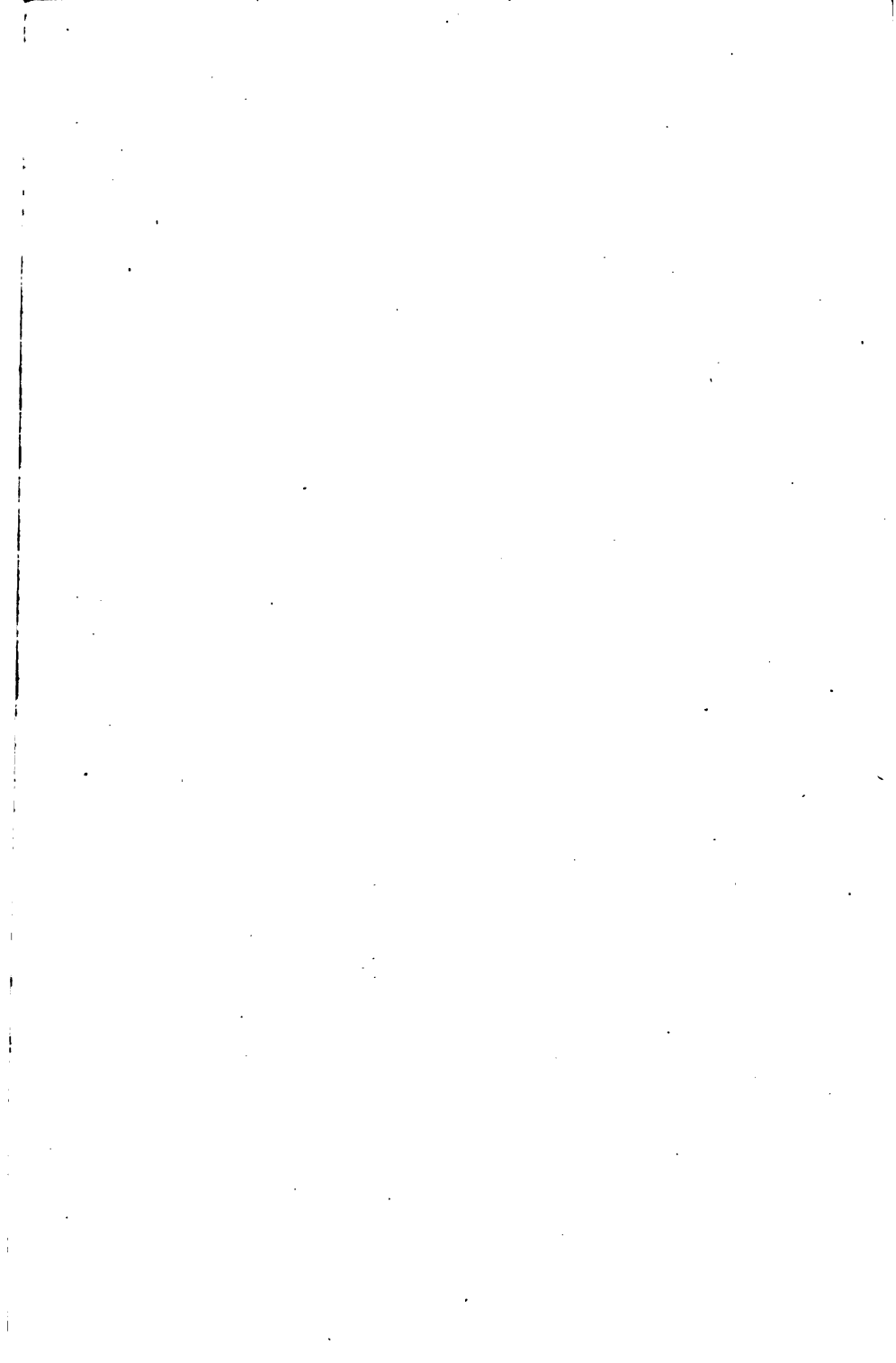
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Charles A. Glover.











COMMERCIAL GEOGRAPHY

BY

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PREFACE

ALTHOUGH Commercial Geography is concerned largely with the conditions of interdependence existing among the different parts of the civilized world, the deeper purpose of the study is the discovery of the causes that have been most active in creating these conditions. That this study is of vital importance is attested by the fact that in ignorance of, or indifference to, such causes, nations have often adopted policies that have retarded their progress and worked disastrously against their welfare.

As applied to our own country, this study is especially stimulating; for we have advanced to the front rank in the leading industries of agriculture, mining, manufacturing, and transportation. If this prosperity were due entirely to the generosity with which Nature has showered her gifts upon us, no lesson could be drawn from it; but the history of the past, and a comparative study of different countries in the present, teach us that without man's earnest and thoughtful coöperation the greatest wealth of natural resources may coexist with the greatest stagnation in development. If, therefore, in the face of competition that grows keener as the years advance, we would maintain our superior position, we must not grope blindly, but must know the causes of success and failure, and act with the clearest understanding.

With such ideas in mind this book has been planned. It begins with a study of the influence on industrial progress of climate and topography, of social conditions, of manufacturing and transportation facilities, and of financial conditions, giving due weight to each as a factor in economic development.

When this foundation is laid, the student is ready to consider with a broader interest the chief commercial products of the world, their relative importance in different regions, and the modern processes of manufacture of the staple articles consumed. Then, beginning with the United States, he studies in greater detail the actual conditions existing in the principal countries of the world and the forces that are operating to the continuance or change of such conditions.

The relations of the various industries to one another, and their location in different parts of the world, are shown graphically by maps and by percentage diagrams or tables, while definite quantities are given in tables at the end of the book.

It is believed that this study will give the student a good foundation for whatever business the future years may hold in store for him, an enduring pride in his country and loyalty to its institutions, and a readiness to serve it as a good citizen in any capacity that may be allotted to him.

The thanks of the authors are due to many for information and assistance courteously given; but especially to Mr. C. T. McFarlane, Principal of the State Normal School, Brockport, N.Y., for his careful revision of the manuscript and proofs of the book; and to Miss Louise Connolly, Supervisor of Schools, Newark, N.J., whose thorough knowledge of pedagogy and practical teaching experience in commercial high schools have rendered her suggestions particularly valuable.

Responsibility of School

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COMMERCIAL GEOGRAPHY



CHAPTER I

INTRODUCTORY

Robinson Crusoe, on his far-away island, had neither trade nor commerce. Except for the supplies that he recovered from the wreck of the ship, he obtained his food from the plants that he cultivated and from the wild animals that he killed. His clothing was made from the skins of goats; his table and his chairs were the work of his own hands. Even his shelter was constructed of stone and wood that he found on the island. If he had more of one product than he needed, he could not exchange it for other necessary articles. If provisions, utensils, clothing, tools, or metals were lacking, he could not buy them. He was by turns hunter, fisher, tanner, farmer, miller, baker, blacksmith, and carpenter.

Trade among Savages. — Men having access to their fellow-men have been traders as far back as history goes. They have exchanged articles less desired for articles more desired. Indians in America, even before its discovery by the whites, had some commerce by means of which distant tribes became possessed of ornaments made from copper that came from the mines near Lake Superior, of peace pipes made from a red

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stone obtained in Minnesota, of pottery from remote western tribes, and of wampum, serving as money, from the seashore. In like manner the savage tribes of Africa and of Australia, when first known to us, had already made exchanges of surplus things for things needed, having thus among themselves feeble elements of trade.

How Commerce Arises. — As men have advanced in knowledge and culture their labor has become more specialized and better adjusted to the natural surroundings. Instead of aiming to produce and manufacture everything needed for their own health and comfort, they have learned to follow that particular industry which brings the largest practical results with the least effort, and to exchange the surplus for products that can be more cheaply procured from others. Without means of communication, such as roads, railroads, and waterways, exchanges are limited to the immediate neighborhood. < Enlightened peoples have, therefore, provided means and organized methods of transportation. > In each town and county there are common roads for the use of vehicles of all kinds. Such common roads are feeders and distributors to railroads that have been built by states or by corporations. Canals have been dug, docks and warehouses have been built, harbors have been improved, light-houses have been erected, and great navies have been built by the leading nations of the world for the protection of their foreign trade.

The description of the articles most extensively bought and sold, including their sources, their methods of manufacture, their transportation by land and water, and the description of the countries of the earth with reference to their products and trade relations, constitute *Commercial Geography*.

The products of the forest, the field, the mine, and of animals, — such as timber, wheat, iron ore, hides, — are called *raw materials*. When such products undergo a slight modification partially fitting them for actual use, as lumber, flour, pig iron, and leather, they are called *semi-raw materials*. When combined or changed in form, and fully prepared for sale and

use, they are *manufactures*. Thus wheat is ground into flour and then made into bread; iron ore is smelted and forms pig iron, or billet steel, which is made into tools, machines, structural steel, or rails; the hides of animals are tanned into leather, which is used to make boots and shoes. These materials—raw, semi-raw, and manufactured—are bought and sold, stored in warehouses, and transported sometimes vast distances over land and water to the consumer. If the entire history of each product—its origin, its changes of form, its transportation, and its final use—lies within the bounds of a single country, it forms a part of *domestic commerce*. If, at some stage of its transfer from hand to hand, it passes beyond the boundary of the country in which it was produced, it forms a part of *foreign commerce* also. It forms a part of the *exports* of the country from which it is sent; it forms a part of the *imports* of the country into which it is sent, and enters into its domestic commerce. Thus the domestic or internal commerce of a country includes its foreign commerce, and is the true index of the country's commercial rank. The country or city in which a demand or need for a product exists is called a *market*. The market may be good or bad according to the extent of the demand. The products of each region are sent to such markets as the seller thinks will be best. Goods shipped to a poor market may be transshipped to a better one or they may be held in warehouses until the demand rises.

Exports are from Surplus.—It will be at once seen that the exports and imports of each country show quite clearly what kinds of commodities are produced abundantly, since the exports are usually the surplus product not used in the country where it is produced, while the imports are articles not abundantly produced at home. If a country raises more wheat or rice than its people need, some will be sent to other countries where a demand for wheat or rice exists; but if all is needed at home, none will be exported. Thus, the United States exports wheat and cotton because more of each of these products is raised than the inhabitants of the country use; but France,

*Implications
includes what*

although raising a vast amount of wheat, exports none, because the people consume all they raise. On the other hand, the United States imports rubber, tea, and coffee, because its climate is not adapted to their culture and they are not produced. These articles, therefore, must be supplied by imports.

Physical Conditions affect Commerce.—The location of a country, its extent, its climatic variations, its soil, and even the underlying strata of rock or mineral, have a great and often a controlling influence upon the nature and amount of its natural products. Even slight variations of soil, of heat and cold, or of rainfall, render one crop profitable and another unprofitable. The apparently fortuitous nearness of one stratum of rock or deposit of mineral to another may make the working of a mine profitable or unprofitable.

When deposits of good coal, iron ore, and limestone are found close together, iron can be produced economically. Even where they can be brought together cheaply, iron can be profitably produced. Where water power exists with ready means of communication to supplies of raw materials and with cheap access to good markets, manufacturing may be carried on profitably. Thus the manufactures of a country, as well as its natural products, depend in large measure upon the geological strata, the surface, the climate, and the means of communication.

*Not limited
industry
anticipating
future*

Limitations of Commerce.—In the markets of the world no product can be profitably sold if the selling price does not exceed the original cost of the product and of transportation to market. It follows that some bulky and weighty materials cannot be marketed long distances from the places where they are produced. This is true also of perishable articles, such as raw vegetables, milk, and some fruits, since they may spoil on the way to market. The cost of transportation to market and the time consumed before the buyer can be reached are therefore important considerations in commerce. If the cost of marketing is too great, the production will diminish.

Use of Money.—The exchange of commodities is seldom made directly. Wheat is rarely exchanged for calico or sugar. Money,

or some representative of money, serves as a medium of exchange. This is the only (real use of money.) The kind of money that shall be used within a country is determined by law and by custom. Most commercial countries have minted gold coins, silver coins, and smaller coins of bronze or nickel. Nearly all civilized countries use notes, which are promises to pay money. Notes are usually issued by the nation or by banks authorized by the nation.

Although small transactions within a country are made by the use of money and notes, a much larger amount is carried on by checks and drafts. A check is an order, written by a person who has money deposited in a certain bank, to pay a certain sum to the person named in the check, or to his order, or to the bearer. A check often serves to pay more than one creditor before it is presented to the bank. A draft is a similar order made by one bank to another bank, and it also may be transferred.

The money used within a nation may or may not be usable in another nation. Gold coins retain their full value, since gold is used as a standard of value by most nations everywhere. Payments due to foreign nations are therefore made in gold or its equivalent. Drafts on banks generally serve instead of transporting the gold itself; but sometimes gold is carried, usually in the form of bullion. When the coin itself is exported, it has simply its merchandise value, as determined by its weight and fineness.

Standards. — In trade it is necessary also to have standards of weight and measure, by the use of which quantities may be accurately defined. Each nation establishes its own system of weights and measures. As the first settlers of the United States were Englishmen, they brought with them the English standards, and these are now generally employed. The French metric weights and measures are widely employed by other nations.

Commerce also requires that particular kinds of goods should conform in grade to certain standards of quality or purity. Officials are therefore appointed at trade centers to examine the sample materials and certify as to their quality. This is particu-

larly the case with widely used commodities, such as meats, grain, and iron.

Just as commerce could be carried on more easily if all the people of the world used the same coins and the same weights and measures, so a common language would render intercourse more convenient; but this seems unattainable, and the man who wishes to deal widely in any branch of foreign trade needs to master more than one language. English, German, French, and Spanish are the chief languages of commerce.

Social Conditions affect Commerce.—Commerce, including as it does all the industries of civilized men, is not wholly controlled by geographic conditions, such as location, soil, and climate; it is influenced largely by man. Most of the activities that are of primary importance had their origin beyond the period covered by history; but their great development and expansion have been attained since the invention of printing and of the compass, and especially since the utilization of steam in manufacturing and transportation.

The soil of the United States was just as fertile when first seen by white men, as it is now. It was then well adapted, by natural conditions, to crops of grain and cotton. Its rivers and lakes were traversed by birch-bark canoes and dugouts, but were not darkened by the smoke of steamers; its deposits of coal and iron, gold and silver, rested unmolested in the earth; its waterfalls turned no mill wheels. The white men cleared away the dense forests and planted crops of grain; the native wild beasts were soon nearly exterminated, and their places taken by herds of cattle, horses, sheep, and swine. Roads were opened to every farmhouse, thus preparing a way for commerce. Railroads were built, connecting all the large towns with the great trade centers. Sailboats were later replaced by steamboats. Manufactories arose at favorable points; mines of all kinds of metals were opened. The country was transformed. It had supported not more than a half million wandering Indians; it now supports eighty million people, and exports vastly more of value than it imports.

With the white men came government, civilization, and education, all of which have a powerful influence upon commerce. Every industry has profited by increasing knowledge. The farmer has learned what crops to plant and how to cultivate them; the grazier has learned what breeds of cattle, sheep, or horses are best suited to the district in which they must feed, and how to bring them to their greatest perfection; the miner has learned where to seek for mineral wealth and how to separate the metal from the ores; the manufacturer has learned where to procure the raw materials needed and how to combine them by the use of the most perfectly adjusted machinery; the merchant has studied the markets, not only of his neighborhood, but of the world, seeking to find a profit by exchanges of products; the railroad companies have studied how to promote the amount of traffic over their roads. No one of these branches of commerce can greatly prosper unless all prosper; for they are mutually dependent one upon another. This has often been shown by the failure of certain crops over great areas. When such short crops occur, the farmer may suffer first, but he is by no means the last to feel the effect. The merchant loses trade, the manufacturer cannot sell his products, the railroad has little freight, and hard times become general.

Since commerce embraces so many subjects, each of them of great magnitude and all closely related, special commercial schools have been founded in the most highly civilized countries for the study of such branches as will best fit the pupils for high positions of trust in commercial enterprises.

I. COMMERCIAL CONDITIONS

CHAPTER II

CLIMATE AND TOPOGRAPHY

Classification of Physical Conditions. — The principal physical conditions of a country that influence its commerce are its climate, its soil, its geological formation, and its topography.

Climate. — By the climate of a country is meant the condition of its atmosphere as regards heat or cold, and moisture or dryness, manifested in its succession of weather changes throughout the year. Whatever affects either the temperature of the air over any place, or the quantity of moisture present in the air, will affect its climate. The most important elements of climate are, therefore, temperature and moisture.

Temperature. — The principal circumstance affecting the temperature of a place is its *latitude*. The nearer a place is to the equator, the more nearly vertical will be the rays of the sun, and hence the greater the number of rays falling on a given area.

Modifiers of Temperature. — Since the sun is the principal source of the heat received at the earth's surface, it might be supposed that all places in the same latitude have the same temperature. But this is by no means true. Places at the same distance from the equator have very different temperatures. This is because of the influence of certain agencies which variously modify the temperature due to latitude. Some of the principal of these modifiers are: altitude, distribution of land and water areas, direction of the winds, direction of slope, position of mountain ranges, and nature of vegetation.

(1) **Altitude.** — The altitude of a place, or its height above sea level, will greatly affect its temperature; for the air does not receive most of its heat directly from the sun, but indirectly from the heated earth. As elevation

increases, the air becomes rarer and less able to retain the heat radiated into it from the sun-warmed earth. The higher, therefore, a place is above the general level of the surrounding surface, the colder is its climate. As a rule, the temperature of the air decreases 3° F. for every thousand feet of elevation above the sea level.

(2) **The Distribution of the Land and Water Areas.** — Land heats rapidly in the sunshine, and therefore readily acquires a high temperature during the *daytime* or during *summer*. But in the absence of sunshine land cools rapidly and thus acquires a low temperature during the *night* or during *winter*. Water, on the contrary, heats and cools slowly and affects the overlying air in a similar way. Consequently, localities near the seacoast are characterized by less marked changes in temperature than localities in the interior of a continent, where great and sudden changes in temperature, with long cold winters and hot summers, are more common.

These differences in the heating of land and water cause the effect of elevation on the temperature to vary in different localities.

(3) **The Direction of the Slope of the Land** affects the temperature, since that slope which receives the sun's rays in a direction most nearly at right angles to the surface will be the warmest. In the northern hemisphere the southern slopes, and in the southern hemisphere the northern slopes, are usually the warmest. This is the reason why one slope of a hill may show its vegetation in spring earlier than another slope. In the United States and Canada, it is the southern slopes of the hills and mountains that are usually best suited for orchards.

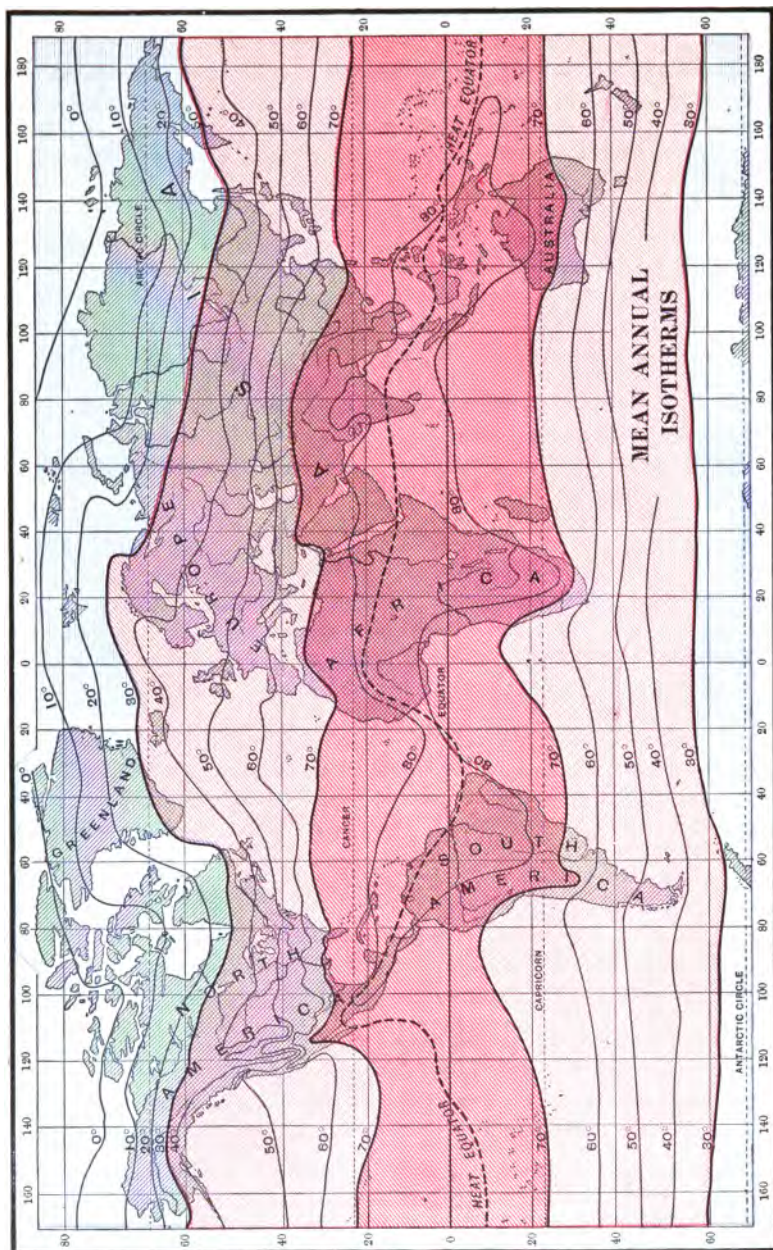
(4) **Position of Mountain Ranges.** — Apart from the influence a mountain range has on the temperature of its slopes through altitude, it may also affect the temperature of the surrounding country by shielding it from cold or warm winds, or by causing a heavy rainfall on one of its slopes and a scanty rainfall on the other.

(5) **Nature of the Covering of Land Surface.** — The temperature of a land surface, arising from a given exposure to the sun's heat, is also affected by the nature and extent of its surface or covering. When covered by dense vegetation, such as forests, or when wet and marshy, it heats and cools less rapidly than when the vegetation is scanty or the region very dry, as in deserts.

(6) **The Direction of the Winds** and their humidity greatly influence the temperature of the countries over which they blow.

(7) **Ocean Currents** also greatly influence the temperature of the countries near whose shores they pass, if the prevailing winds are shoreward.

Temperature Zones. — Isothermal lines are lines connecting places on the earth's surface that have the same temperature, or the same average temperature for the day, month, or



(10)

FIG. 1.

year. On account of the modifiers of climate above referred to, the isothermal lines do not conform to parallels of latitude, but extend around the earth in an exceedingly irregular manner, as shown by the mean annual isotherms in Fig. 1, where dark red represents the hot zone, light red the temperate zone, and blue the cold zone. The isotherms of 30° F. and 70° F. are taken as the boundaries of the cold and the hot zones respectively.

The thermal or heat equator, or the line of greatest mean annual temperature, does not coincide with the geographical equator, but, as shown on the map, lies generally north of it.

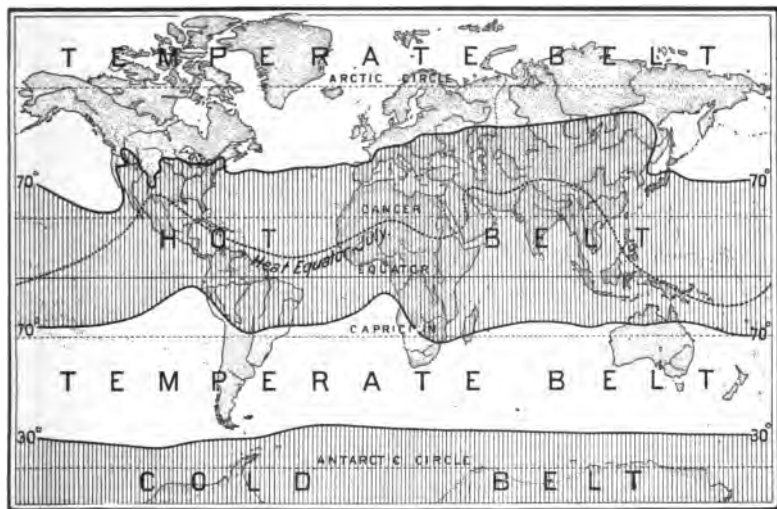


FIG. 2. — Temperature Zones or Belts for July.

Seasonal Changes of Temperature. — In order to get clear ideas of the actual distribution of temperature over the earth, it is necessary to study maps showing the mean temperature during different seasons of the year. In its annual journey around the sun, the earth, owing to the inclination of its axis, receives the vertical rays of the sun in different latitudes at different times of the year.

In the latter part of June the vertical rays fall on the Tropic of Cancer and give summer to the northern hemisphere. (Fig. 2.) Note carefully the position of the isotherms of 70° F. at this season (July) with respect to the Tropics of Cancer and Capricorn. Note also that at this season the isotherm of 30° F. does not appear in the northern hemisphere, while in the southern hemisphere it lies far to the north of the antarctic circle.

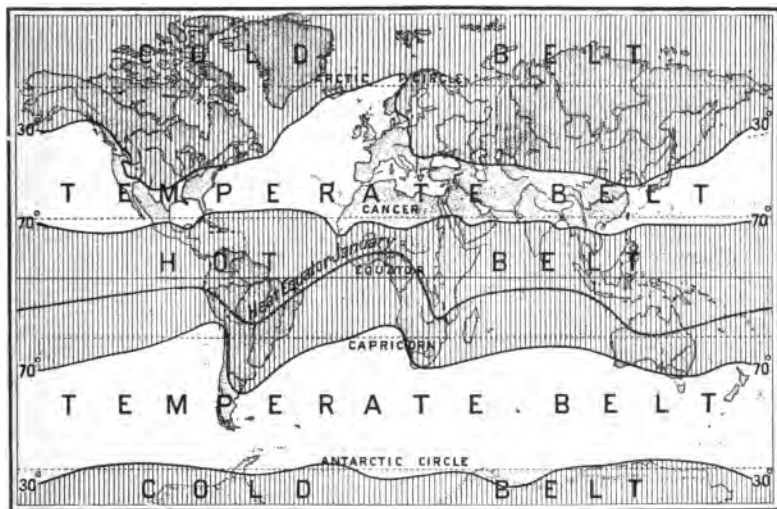


FIG. 4. — Temperature Zones or Belts for January.

In the latter part of December the sun's vertical rays fall on the Tropic of Capricorn, and give summer to the southern hemisphere. (Fig. 4.) At this season the northern hemisphere has winter and the (January) isotherm of 30° F. lies over Central North America and Eurasia, while the two isotherms of 70° F. and the southern isotherm of 30° F. lie much farther south than they do in July.

Climatic Belts. — Thus it is seen that all the isotherms move northward and southward during the year — lying farthest north in July and farthest south in January. This annual movement of the isotherms of 30° F. and 70° F. gives rise to certain climatic belts, which are indicated in Fig. 3.

These belts are more irregular in the temperate regions of the northern than of the southern hemisphere because in the southern hemisphere these regions are nearly all water and hence have a more equable temperature.

Ocean Currents. — To a varying depth the water in most parts of the surface of the ocean is constantly moving forward. In some regions this movement is sufficiently rapid and constant in direction to constitute true currents, as the Equatorial Currents, the Gulf Stream, the Kuroshiwo, etc. In other regions the movements are slower and less constant in direction and form drifts rather than true currents. These movements of the ocean water have been attributed to various causes, but it is now generally held that both currents and drifts are due initially to the action of the winds. The currents and drifts result in the circulation of the surface waters of the ocean, the warmer equatorial waters being carried away from the equator to latitudes 45° or 50° N. and S. in the western side of the oceans, and cool water of these latitudes being carried toward the equator in the eastern side of the oceans. Beyond these latitudes, however, in the northern Atlantic and Pacific Oceans the relatively warm water moves northward on the eastern side of the ocean, and the cooler water southward on the western side.

Influence of Direction of Ocean Currents on Commerce. — Since the progress of a vessel is aided when it is going with an ocean current, and retarded when it is going against such a current, a knowledge of the directions of constant ocean currents is of great advantage to the navigator.

Trade Winds. — The air over the thermal equator is constantly being forced upward by the cooler and heavier air from regions north and south of it. Surface currents of air moving from near the tropics toward the thermal equator are thus formed. To these the name *trade winds* has been given. Over the level surface of the sea these winds blow constantly and steadily during most of the year. They are deflected to the westward by the rotation of the earth and approach the thermal equator from the northeast in the northern hemisphere, and from the southeast in the southern hemisphere.

Equatorial Calms. — In a narrow region along the thermal equator, where the air is rising, there is little or no perceptible

wind for days or weeks at a time, but air is chilled as it rises and its moisture is condensed, hence these calms are characterized by cloudy weather, frequent heavy rains, and thunder storms.

Tropical Calms, or the Calms of Cancer and Capricorn. — At the outer limits of the trade wind zones, in the northern and southern hemispheres, are two other narrow belts that are also characterized by calms. In these calms the weather is generally dry and cloudless, for the air from the upper regions is gradually settling down and becoming warmer as it descends.

Zones of the Prevailing Westerly Winds. — Beyond the calms of Cancer and Capricorn, the winds are much less constant and regular than the trade winds, and they blow away from the equator. They are deflected by the rotation of the earth, and move generally from the west in both hemispheres. These wind zones are therefore called the *zones of prevailing westerly winds*.

Cyclones are storms in which the wind moves inward and upward, in a vast whirl or eddy, around a region of low barometric pressure. In the northern hemisphere, the wind always rotates or whirls in a direction opposite to the movement of the hands of a clock. In the southern hemisphere it always rotates in the same direction as the hands of a clock. At the same time the entire body of the storm advances, across the surface of the region, generally in the direction of the prevailing winds.

Cyclones of terrific violence sometimes occur in the trade wind zones, particularly among the West Indies, where they are called *hurricanes*, and in the China sea, where they are called *typhoons*. Hurricanes and typhoons generally advance toward the northwest to the edge of the trade wind zone, where they curve and advance with diminished violence to the northeast in the zone of prevailing westerly winds.

Cyclonic storms are much more frequent, but usually less violent, in the zones of prevailing westerly winds, across which they move from west to east in almost endless procession.

Land and Sea Breezes. — The differences of temperature between the air lying over the land and water during the warmer and cooler halves of the day cause a wind called the *sea breeze* to blow from the ocean to the land during the daytime, and a wind called the *land breeze* to blow from the land to the ocean during the night.

Monsoons. — Similarly, the differences of temperature between the land and

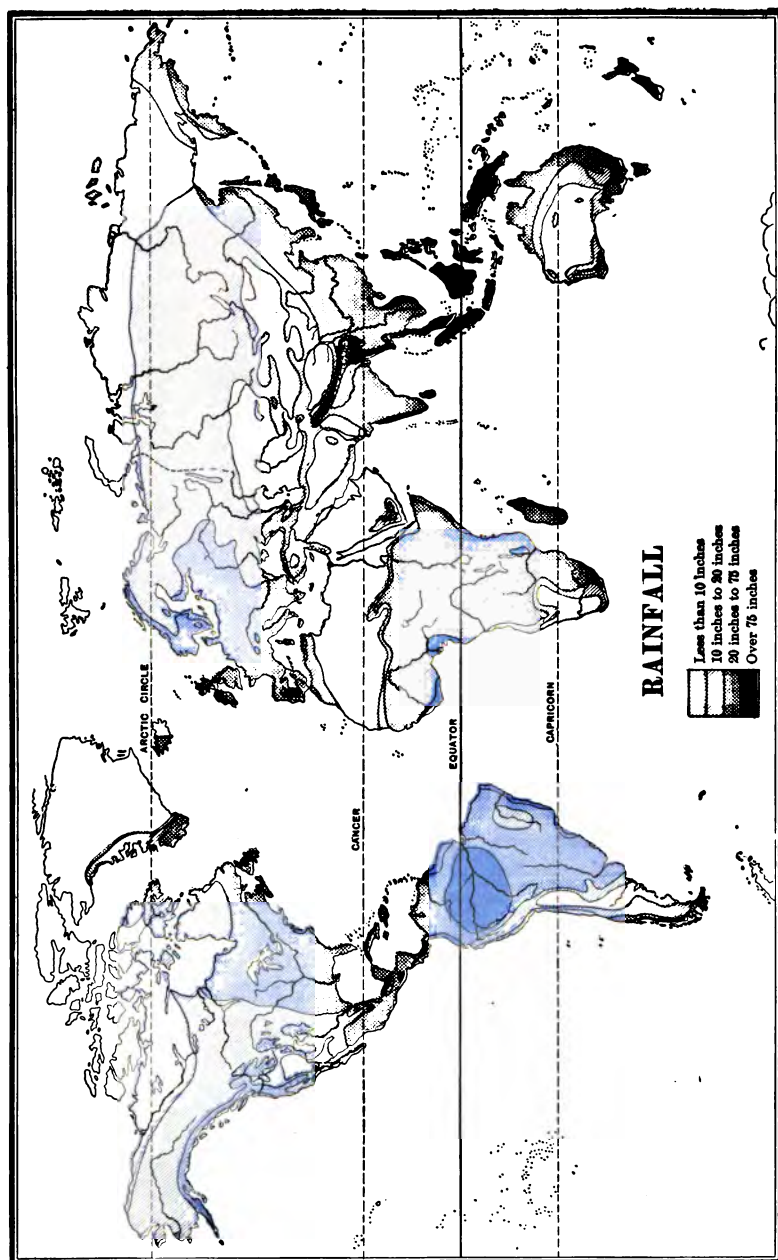
the water, during the warmer and cooler halves of the year, tend to cause seasonal winds, called the *monsoons*, to blow from the ocean toward the land in summer, and from the land toward the ocean in winter. Three well-marked regions of monsoons are found : viz., in the Indian Ocean, in the Gulf of Mexico and the Caribbean Sea, and in the Gulf of Guinea.

Rainfall. — The lower atmosphere always contains more or less water in the form of invisible *vapor*. When a mass of air contains all the vapor it will hold it is said to be *saturated*. But warm air will hold more vapor than cold air. Hence if saturated warm air is cooled, a part of its vapor condenses into water and appears as *cloud, fog, rain, or snow*. Saturated air carried upward, or away from the thermal equator, north or south, therefore yields rain. Air currents passing over a mountain range commonly yield rain. Hence the topography of a country affects this element of climate.

Rainfall in the Zone of the Equatorial Calms. — In the zone of equatorial calms heavy rains occur daily. The mornings are clear, but gradually the clouds appear and accumulate until afternoon, when heavy rains, with thunder and lightning, continue often into the night. Here the rain is caused chiefly by the cooling of the rising air as it expands.

Rainfall in the Zones of the Trades. — As the trade winds advance toward the thermal equator, they grow warmer and therefore take moisture from the regions over which they blow, rather than give moisture to such regions. When blowing over the ocean they cause so great an evaporation that these parts of the ocean are saltier than other parts. The clear weather and the steady winds in these zones are very favorable to commerce.

In passing from the ocean to the land, the trade winds may bring heavy rains, if they are forced to ascend the slopes of a high mountain or plateau. Here, the chilling caused by expansion, and by the cool sides of the mountains, causes the saturated air to give up its moisture. On the opposite side of the mountain or plateau the rainfall is either less heavy, or entirely absent, both because the air has deposited nearly all its moisture on the windward side of the mountain, and also because the air, on descending, is compressed, becomes heated, and, therefore, tends to promote evaporation. It is for these



(18)

FIG. 6.

reasons that the regions east of the tropical Andes are so well watered by easterly winds, and those on the west are practically deserts. In general, within the tropics, the heaviest rainfall occurs during the hottest season of the year.

Zones of the Prevailing Westerly Winds.—These winds, advancing as they do toward the poles, are growing colder, and therefore are apt to deposit their moisture as rain. As we have seen, they are attended by many *cyclonic storms*, which are accompanied by wet, stormy weather.

In the center and on the east side of such cyclonic storms, the air is cooled, both because it is rising, and also because it is moving away from the equator toward a colder region. It therefore deposits its moisture as rain or snow, on the eastern side. It is warmed on the western side because it is moving toward the equator, and thus a warmer region. Consequently the eastern side of cyclonic storms is marked by cloudy and rainy, and the western side by clearing, dry weather.

Mean Annual Rainfall.—The average annual rainfall on the land in different parts of the world is shown in Fig. 6. Here the land areas that receive an excessive rainfall (75 inches or more) are colored solid blue; those which receive a quantity sufficient for agricultural purposes, *i.e.*, more than 20 inches, are colored with cross lines of blue; those which receive less than 20 inches, but more than 10 inches (a quantity too small to permit of general agriculture, without irrigation), are colored with parallel blue lines; and those which receive less than 10 inches, and may, therefore, be regarded as deserts, are colored with the lightest blue shade.

An examination of the map will show that rainfall decreases in general from the equatorial toward the polar regions. More rain falls on mountains than on plains, especially on the windward slopes of mountains. Generally, more falls on the windward coast of a continent than in the interior, except where high mountains are in the interior, when the rainfall on the windward slopes is greater than elsewhere. Consequently, in the zone of the trades, the east coasts have a heavier rainfall than the west coasts. In the zone of the prevailing westerlies the reverse is true.

In tropical countries, where both rainfall and heat are exces-

sive, the vegetable life is wonderfully luxuriant, the forests being so dense that it is difficult to clear them for agriculture. The influence of rainfall upon the character of vegetation in any region will be revealed by comparing Fig. 6 with Fig. 7.

The Greatest Mean Annual Rainfall in the world occurs on the southern slopes of the Himalayas, north of the Bay of Bengal. Here the annual fall equals about 480 inches, or 40 feet. Since more than half of this occurs during the summer months, when the southerly monsoon prevails, some idea can be formed as to the severity of the rainstorms.

The Rainfall in the Polar Regions (here estimated by the number of inches of water that would be produced if the snow were melted) varies from 15 inches for the heaviest average fall to less than 10 inches.

Desert Regions of the Earth. — The rainless regions of the earth are its desert regions. In the Eastern Continent a desert belt extends from the western shores of Africa eastward and northeastward through central Asia. It includes the Sahara, the Deserts of Arabia, Persia, Afghanistan, Baluchistan, and Mongolia.

Deficiency of rain is due to a variety of causes. During part of the year, much of the Sahara and of Arabia lies in the region of the calms of Cancer, where the descending air is compressed as it falls, and therefore warmed, and absorbs rather than precipitates moisture. When the calms of Cancer shift their position, and are replaced by the trade winds, these winds are necessarily dry, both because, having come from colder regions over Eurasia, they have had no opportunity to acquire moisture, and also because their increase in temperature as they advance toward the thermal equator will cause them to absorb rather than precipitate moisture. In central Asia the high mountains that border the plateaus cause practically all of the moisture to be deposited as rain on the windward slope of the mountains, so the plateaus get little.

In the Western Continent deserts are found on the western slope of the tropical Andes, and in the United States along the eastern slopes of the Pacific mountain range, especially in southern California, Arizona, and Nevada. Desert lands occur also in southwestern Africa, and in central and western Australia.

Rocks of the Earth's Crust. — The rocks of the earth's crust, so far as they have been observed, are classed as: —

1. *Igneous*, or those which have cooled from a molten state — such as lava and some varieties of granite.

2. *Aqueous*, or *stratified*, those deposited in more or less horizontal layers or *strata*, as sediment by water — such as shale, sandstone, and limestone.

3. *Metamorphic*, those originally of igneous or aqueous origin, but subsequently changed or metamorphosed by the joint action of heat, moisture, and great pressure—such as slate, marble, and some kinds of granite. Metamorphism generally crystallizes rocks and removes to some extent the traces of stratification.

During the vast extent of geological time, rocks of aqueous and igneous origin have been deposited in more or less successive layers. The aqueous rocks, where undisturbed or unmetamorphosed, still retain their horizontal positions, and show the successive strata in which they were originally deposited. But, during the cooling of the heated interior, the earth's crust has been repeatedly fissured and broken, and in many places the horizontal layers have been upturned or crowded into a succession of folds. In other places the rocks over great areas have been uplifted bodily with very little disturbance of their horizontal stratification.

Erosion of Rock Masses.—The earth's surface has been profoundly modified by the eroding action of running waters, and by moving ice masses called *glaciers*, by means of which rock formations of great thickness have been removed over wide areas and carried away as sand and gravel. In regions of folded strata, erosion may have removed the upper part of the folds, leaving the steeply inclined edges of successive strata, which formed the sides of the folds. In some parts of the earth only the earlier rocks remain, in others one or another of the successive geological formations form the surface rocks. It is by such processes that the topography of the land is modified.

Influence of the Geological Formation on the Accessibility of the Mineral Products.—Since most of the earth's mineral products are found in greater abundance in the rocks of certain geological formations than in others, the mineral wealth of a country is necessarily dependent on the distribution of its geological formations.

Influence of the Topographical Features of a Country.—The topography of a country, such as the distribution of its land and water areas; the directions of its mountain slopes; the relative positions of its high and low lands; the number, size, and depth of its lakes and rivers; the direction and character of its rivers;

the extent of its coast, the character of its indentations and the depth of water in them, as permitting or preventing their use as harbors; the general character of the surface, as aiding or opposing agriculture, and the construction of canals and road-ways, — all influence in a marked degree both the occupations of the inhabitants of such countries and the extent of their commerce.

An extended coast line, with deep indentations, where the sea penetrates far into the land, by giving easy access to the interior and ready communication with other countries, is of great commercial advantage to a country. Europe and the eastern part of North America have this advantage to a much greater degree than Africa, Australia, and South America.

The extent of a country affects its commerce. Very extensive countries possess a variety of climate, soil, and geological strata, and hence a variety of commercial products.

We have seen that mountains affect the rainfall of adjacent regions. They also interpose barriers to transportation, and form the natural boundaries between countries. Thus, the Himalayas separate the peoples of China and India; the Pyrenees separate the French and the Spanish.

The Slope of the Land, besides its effect upon temperature, determines the direction and rate of flow of the rivers, and influences commerce by the character of the water routes it offers and the readiness with which they can be used for intercommunication, either by means of the rivers themselves, or by means of properly constructed canals. The slope of the land determines also the existence of waterfalls in the streams from which water power may be obtained for use in manufacturing.

Suitability of Coasts for Harbors. — No extended sea-borne commerce is possible without suitable harbors where vessels may anchor while receiving or discharging their cargoes. A good harbor is so inclosed as to afford protection from winds and waves, has a good depth of water, and is accessible from the open ocean. The absence of harbors acts as a serious natural barrier to a country's commercial development. Where natural harbors did not exist, artificial harbors have often been constructed at enormous cost. Notable among such artificial harbors may be mentioned that at Glasgow, where an inconsiderable stream, the Clyde, has been changed into a magnificent harbor.

CHAPTER III

INFLUENCE OF CLIMATE AND TOPOGRAPHY ON LIFE

Relation of Plants to Minerals and Animals. — Both plants and animals must have proper food, and, moreover, both must have certain conditions of climate in order to live. All plants possessing green leaves have the power of taking the raw materials that form their food from the atmosphere and the soil. Under the influence of the sun's light and heat, they manufacture from these simple elements the complex substances called *proteids*, which are essential in animal food. Plants alone possess this power, hence animals must feed on plants or on other animals, and are, therefore, dependent on plants for their existence. But plants are dependent on minerals, since plants need the soil in which they live, in order to obtain some of the substances from which they manufacture their food. Hence plants occupy an intermediate position between minerals and animals.

Both plants and animals are likewise dependent on climate, but this in turn is greatly modified by topography; therefore, both the climate of a country and its topographical features affect the character of its plant and animal life.

Essentials of Plant Life. — Although soils are of great importance to plant life, yet the conditions of moisture, heat, and light are of much greater importance, since, if these are present, the simpler forms of plant life will appear, and a soil capable of sustaining higher plant forms will gradually be formed by the disintegration or weathering of the rocks. But the climate of a country embraces the conditions of its moisture, heat, and light. Consequently, the climate of a region is the chief factor that determines the character of its plant and animal life.

Each climatic zone, therefore, is characterized by groups of plants and animals peculiar to it, called respectively its *flora* and its *fauna*.

Plant Migrations.—There are various means by which the seeds of plants are carried from place to place. Some, like the thistle and the dandelion, are provided with winglike appendages, and are carried great distances by the winds; others have burs or hooks, by means of which they cling to the fur of passing animals, and are thus transported; some, as in many fruits, are swallowed whole by animals, and pass through them undigested to take root where they fall; some are carried by rivers or ocean currents; and others are accidentally carried away in various articles of commerce to remote parts of the world. Most of the cultivated plants have been purposely carried by man to distant countries. If the seeds, so transplanted, find suitable conditions of climate and soil, they will flourish in their new homes, sometimes even driving out the native plants. If favorable conditions are absent the invading plants will naturally perish.

Plant Barriers.—Certain of the physical conditions of a country may oppose barriers to this migration. *Mountain ranges* afford an instance of such barriers; but climatic conditions may prove more insurmountable. *Oceans* and *deserts* also form natural barriers to plant migrations.

Plant Regions.—It is on account of these *barriers* that regions marked by distinct forms or groups of plants are found in all countries. In each district are found plants adapted to the peculiar conditions of that district.

Arid and semi-arid regions have their peculiar vegetation; marshes are characterized by groups of peculiar water plants; forests, which require an abundance of water distributed during the period of tree growth, characterize certain regions. The same is true of cultivated plants. Corn requires heat and a plentiful rainfall during its time of growth; it thrives in the Ohio and Mississippi valleys, but needs irrigation if raised in the drier parts of the United States.

Influence of Soil on Water Supply.—Even in regions where the rainfall is ample for plant life, marked differences are noticeable in the character and

extent of vegetation over adjoining areas. These differences may be caused by the fact that in some places the soil is so open and broken that the rain water rapidly sinks downward, and therefore fails to nourish the plants on the surface. Or the region may be underlaid by masses of limestone, which, on account of its ready solubility, may be traversed by underground passages that rapidly carry off the surface waters.

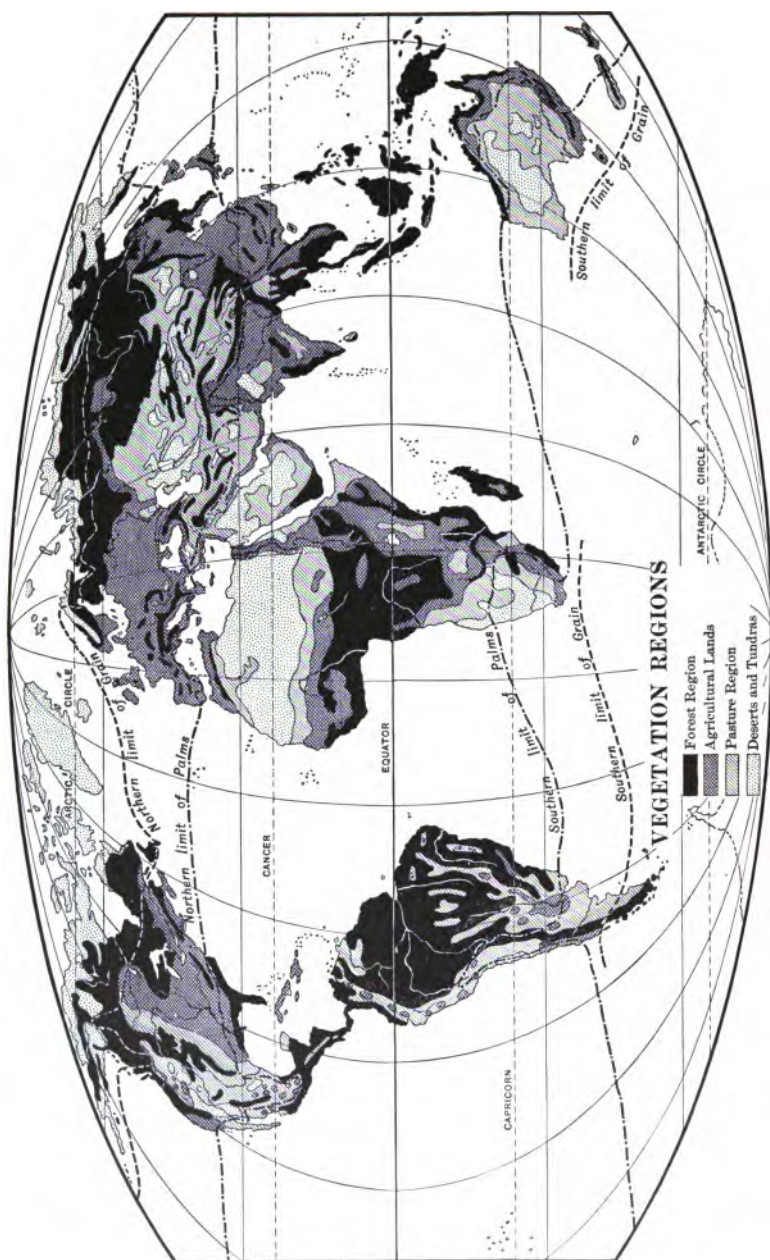
Some Characteristic Plant Regions. — The natural conditions arising from the combination of the climatic and topographical peculiarities of a country are sometimes so favorable for the existence of certain kinds of plants that these occur to the practical exclusion of all other forms, and thus give a characteristic appearance to the region they cover. Some of the most important of these regions are *forests, steppes, meadows, prairies, and deserts.*

Forests. — Most trees require for their best growth an abundance of water available during all seasons of the year, or at least during the seasons of active growth. Forests, therefore, excepting in the regions of the cone-bearing trees, are limited to regions where the rainfall is not less than 20 inches.

Broad-leaved Evergreen Forests. — Most of these require much moisture and heat, and are found only in the tropics, or in the warmer parts of the temperate zones. The conditions of heat and moisture are such as to permit the growth of trees to continue through the entire year; hence the trees are *evergreen*, because ever growing. Such are the dense forests of equatorial Africa, and the basin of the Amazon. Lianes, or climbing vines, cling to the trees and hang in festoons from their boughs, while the damp and shaded ground is covered with vegetation so dense that in places the rivers form the only natural routes through the districts.

Deciduous Forests are those whose growth continues only during a part of the year, and which, consequently, shed their leaves yearly. Such forests are found in the temperate zones. Deciduous forests include such trees as the maple, oak, elm, beech, walnut, chestnut, etc. Large parts of North America and Europe are still covered by deciduous forests.

Coniferous Forests consist of cone-bearing trees with shining green needle-shaped or thin platelike leaves, such as the cedar, pine, spruce, fir, and hemlock. These forests are evergreen, not because they are always growing, but because they do not shed all their leaves until the next season's foliage has appeared. Some cone-bearing trees are able to exist upon a comparatively



small water supply, because their small needle-shaped leaves, with their thick coverings, suffer small loss of water by evaporation.

Leafless Forests.— In certain parts of the world, such as Java, and in the southwestern parts of the United States, forests occur that are practically devoid of leaves. In some of these regions, great cacti replace the trees of other forest regions.

Swamp Forests are regions covered with such trees as the cyprus, juniper, larch, etc., that can exist in the presence of very wet, marshy soils.

Open Grassy Lands.— *Steppes* are regions where the rainfall is either scanty, or absent during certain seasons of the year. Here trees cannot exist except along river courses. During the wet season these regions are covered with a luxuriant growth of grass and herbs, but during the dry season they resemble deserts. Such are the grassy *steppes* of Southern Europe, Asia, and Australia, the *llanos* and the *pampas* of South America, and the *savannas* of Africa.



FIG. 8.— Irrigation Ditches.

Meadows and prairies are districts that resemble steppes, though they have a somewhat greater rainfall. The absence of rain, however, is less marked, and the desertlike appearance, during certain seasons of the year, is wanting. Steppes, meadows, and prairies are peculiarly suitable for grazing, and the large

herds of cattle pastured upon them give employment to the inhabitants of these countries.

Deserts and Tundras. — Regions having a rainfall of less than 10 inches may be regarded as true *deserts*. The aggregate area of such regions has been estimated at 20 per cent of the land surface of the world. About 30 per cent more of the land surface has between ten and twenty inches of rainfall and may be called *arid*, for agriculture is precarious without the aid of *irrigation*. Thus irrigation is necessary over nearly half the land surface of the earth.

For irrigating purposes reservoirs are formed by damming the rivers, and thus storing the water instead of permitting it to run off rapidly. These reservoirs slowly discharge their waters through a system of canals and ditches over the land that is being cultivated. In some cases the water from perennial streams is led over lands of comparatively great rainfall, in order to meet the requirements of certain crops, such as rice. In other regions water obtained from artesian wells is pumped to reservoirs by windmills or other means.

Tundras. — Along the northern margin of both the Eastern and the Western Continents is a wide region in which the soil is always frozen to a great depth. In the short summer, however, the surface thaws and the water, unable to penetrate the frozen ground beneath, converts the whole region into a great swamp or morass in which moss and other low plants grow. This is called a *tundra*.

Vertical Distribution of Plant Life. — The differences of temperature and moisture on the slopes of high tropical mountains, between its base and summit, produce conditions in the flora that correspond closely to those that are observed in passing along the earth's surface from the equator to the poles. Here between the level of the sea and an elevation of 5000 feet the vegetation is, in general, similar to that of the hot belt. Between 5000 and 15,000 feet it is similar to that of the north temperate zones. Between 15,000 and 20,000 feet the flora corresponds, in general, to that of the north and south cold caps.

Dispersal of Animals. — When animals living in any section of a country multiply so rapidly that the region is unable to supply them with food, they must either perish or find a new home. A *dispersal*, therefore, takes place, in which a new home is sought for. Most animals, unlike plants, possess the power of going freely from place to place, yet it is found that they are practically limited to well-defined regions because of *barriers* of some kind which they are unable to surmount.

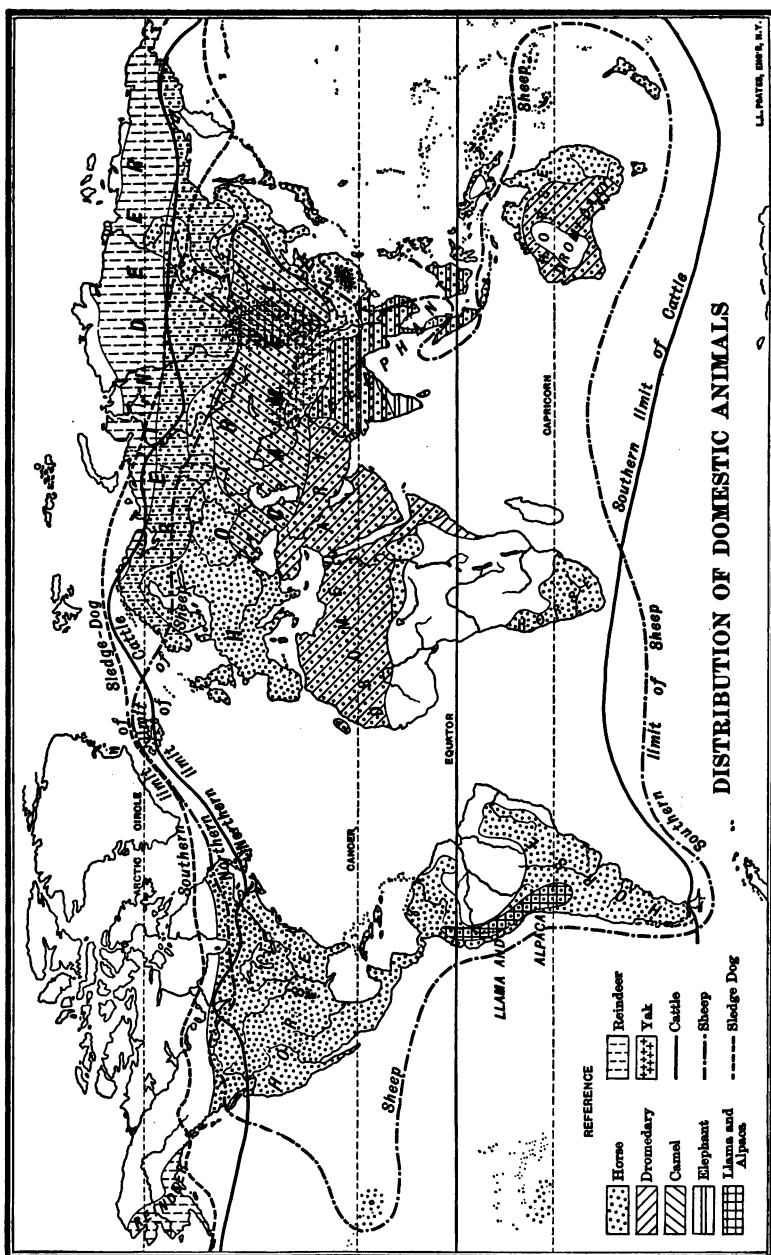
The Character of Barriers to Animal Dispersion. — Geographical barriers, or, as they are more frequently called, the *physiographic barriers*, are found in broad *bodies of water* which are not readily crossed; for example, Mozambique Channel, which has given Madagascar a fauna quite distinct from that of the neighboring coast of Africa. *Broad rivers* are not so effective, since they may be passed during river floods by natural rafts of drifting vegetation, strong enough to afford an occasional means of transit to animals. Indeed, neighboring islands situated some distance from the main shore are frequently reached in this way. *High and extended mountain ranges* also act as barriers to the unchecked dispersal of animals. *Deserts* form effective barriers in the case of all animals that require an abundance of water for their life.

Acclimation. — Within certain limits animals may gradually adapt themselves to the new and very different conditions of a strange home, and be able to live in it.

All animals tend to resemble their parents or ancestors. This is known as the principle of *heredity*. At times, however, certain slight *variations* from the original type occur. If these variations are permitted to go on gradually enough, when an animal has wandered to a region distant from its original home, the species may lose many of its original characteristics. Thus marked variations may occur from the original type; for example, land birds may even become water birds, and birds that live on fruits may become flesh eaters.

In all regions overstocked with animal life there is a constant struggle for food and the other requisites of existence. In the long run the result of this struggle is the *survival of the fittest*; that is, of those animals best fitted to their environment.

Animal Regions. — For all of these reasons, — namely, differ-



ences of climate, differences of topographical features, the struggle for existence, and the survival of the fittest, — the different regions of the earth possess characteristic fauna. The earth's surface may thus be divided into a few great animal regions, in each of which the fauna as a whole differs markedly from the fauna of the other regions.

Domestic animals, especially cattle, sheep, hogs, and horses, being cared for by civilized man and carried with him as he has settled new regions of the earth, are widely distributed. The distribution of the principal domestic animals is shown in Fig. 9.

CHAPTER IV

SOCIAL CONDITIONS

Commerce is affected by Civilization. — As we have already seen, the degree of civilization of a people necessarily affects its commerce. People in a low stage of civilization have few wants that cannot be satisfied by the natural resources of their immediate neighborhood, hence for them commerce is unnecessary. The Eskimo feeds and clothes himself, and sometimes even builds the house in which he lives, from the bones and skins of the animals he kills; while the barbarous tribes of Africa are content with the food that nature yields them without much effort on their part.

As men advance in civilization, their wants multiply. Things which, during a low stage of civilization, were unknown, or regarded as luxuries, later become necessities, until when the highest stage of modern civilization has been reached, the entire world is drawn upon to supply these acquired wants.

Uncivilized Man a Slave to Physical Conditions. — Uncivilized man may permit himself to be so governed by the conditions of the country in which he lives as to make his advance in civilization well-nigh impossible. The very ease with which he can obtain food, clothing, and shelter renders it unnecessary for him to attempt to better his social state. Consequently, he spends much of his time in idleness, and tends rather to retrograde than to progress.

Civilized Man a Master of Physical Conditions. — As man frees himself from the domination of his environment and learns to control it, he rapidly betters his condition. He finds that the very circumstances which previously kept him from advancing,

may be utilized to aid him. The bounty of nature, when properly turned to account and increased through his industry, enables him not only to supply his own food, but also that of thousands of others. Through commerce he may dispose of his surplus products and secure for himself those which he desires from other parts of the world.

The Commerce of a Country is a Measure of its Civilization.

— Savage peoples naturally have little or no commerce or trade with one another, while highly civilized peoples make an enormous exchange of products. This commerce is carried on chiefly with other civilized peoples, since they alone have developed wants that their immediate neighborhood is unable to supply.

The highly civilized European people, and their descendants, are the great producers, manufacturers, and traders of the world. It has been estimated that they conduct nine tenths of the world's commerce.

Effect of the Natural Resources of a Country.— When, because of its great area or for any other reason, a country possesses a very wide range of climate, its natural resources may be so varied, and the extent of its manufacturing facilities so great, that it has comparatively little need of the products of other countries. In such cases domestic commerce or interchange of products between different parts of its own country takes the place of foreign commerce. Countries like Brazil, however, which have no great variety of products, and have, moreover, not yet developed manufacturing industries, must buy largely from foreign countries.

Conditions of Mankind.— The peoples of the world differ widely in their degree of civilization.

The least advanced people of the earth are in the *savage* condition. They are wild and untaught, their clothing is exceedingly primitive, and their food consists of wild fruit, nuts, roots, and such animals as they can readily kill with their rude weapons. The native inhabitants of Australia, many of the tribes of Africa, and some of the American Indians, are in the savage state.

The *barbarous* peoples include those who have made some progress in the arts; they can shape rough pottery; have tamed some kinds of wild cattle,

sheep, and goats; have given a little attention to agriculture; and have improved the rude weapons used by savages. Such people, however, have not yet learned to write. Among the barbarous peoples of the earth are many of the Mongolian tribes of northern Asia and some of the people of India. Nearly all the Indian tribes of North America who occupied the eastern part of the United States at the time of the discovery of the continent were barbarous.

The *civilized* peoples include those who have learned to write, and are, therefore, able to leave records of their actions and thoughts. The greater part of the Mongolian tribes have attained a low degree of civilization. The people of the chief nations of Europe and their descendants in America are among the most highly civilized peoples of the earth. They are sometimes called the *enlightened* races.

Races of Men. — Notwithstanding their manifold individual differences in appearance, stature, and intelligence, mankind is usually divided into a few distinct races; viz., the Caucasian or white race; the Mongolian or yellow race; the American or red race; the African or black race; and sometimes the Malay or brown race.

The Caucasian or White Race is characterized by a white skin, varying from light to darker tints, and, as a rule, wavy hair. Its original home is not known, but is believed to have been somewhere near the Caucasus Mountains. This race inhabits all the highly civilized portions of the world. It embraces the northern part of Africa, southwestern Asia, nearly all of Europe, North and South America, Australia, and New Zealand.

The Caucasian race includes the *South Mediterranean branch*, which embraces the Hamitic and the Semitic stocks, and the *North Mediterranean branch*, which embraces the Aryan or Indo-European. From the Aryans have descended the Hindus, Persians, nearly all the Europeans, and their descendants in different parts of the world.

The Mongolian or Yellow Race is characterized by coarse, straight, black hair, and a yellow or brownish yellow skin.

This race inhabits nearly all of Asia not occupied by the Caucasians. The Malays including the natives of parts of southeastern Asia, of the East Indies and the Philippines, characterized by a brown skin, are, by some, included in the yellow race.

It has two branches; viz., the *Chinese branch*, which includes the people of China, and the *Siberian branch*, which includes the people living in the northern portions of the Eastern Continent, from the Pacific Ocean to the Baltic and Black seas. The second branch includes the Japanese, the most highly civilized people of the yellow race. It includes also the Turks, Finns, Lapps, and Eskimos.

The American or Red Race is distinguished by straight black hair and a reddish skin. This race inhabited North and South America before the white race came over from Europe.

The African or Black Race is characterized by a black skin and woolly, kinky hair. This race inhabits nearly all the southern half of Africa, parts of Australia, the Malay Archipelago, and Polynesia.

Distribution of Civilized Man in the Temperate Zones.—As a rule, man has reached his highest civilization in the north temperate zone. In the *hot zone*, as we have already seen, man is disinclined to work. Consequently, the people of that zone are not, as a rule, far advanced in civilization.

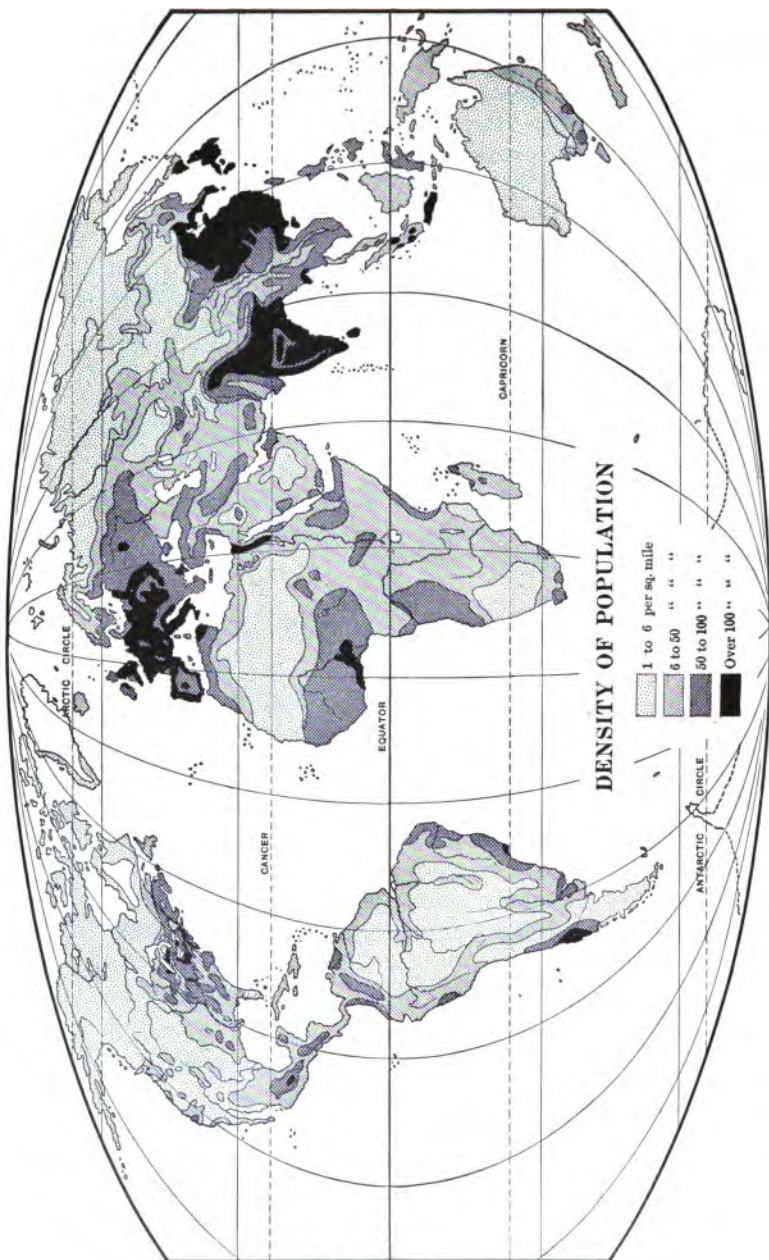
In the *cold zones*, where the natural resources of the country are limited, there is not food enough to support a dense population. Here the struggle for existence is excessive, and civilization is not far advanced.

In the *temperate zones*, where nature rewards intelligence and industry by bountiful harvests, man is at his best. Here foresight is necessary in order to provide food during the winter, and here man reaches his highest civilization.

Population.—The population of the earth, estimated at about sixteen hundred millions, is by no means evenly distributed. About one half is found in southeastern Asia and about one fourth in Europe.

The population varies from less than one person to a square mile over large areas, to about six hundred persons to one square mile, over comparatively limited areas. A far greater density of population is found in cities, towns, villages, and hamlets.

Population of the World according to Race.—The population of the world as regards race is about as follows:—



White Race	818,000,000
Yellow and Brown Races	575,000,000
Red Race	22,000,000
Black Race	185,000,000
World's total population	1,600,000,000

The Earth's Population Increasing. — Despite an enormous emigration, the population of Europe has doubled during the last century. During the same period the population of the United States, even after deducting the nineteen million immigrants it has received from other countries, has increased elevenfold. This increase in population necessarily affects the movements, occupation, and character of the people.

Density of Population. — As the population of a country increases in density, there results a greater specialization of industry, and a more and more complete use of all its resources. This makes it possible to support a greater number of people than formerly upon the resources of a given territory.

The nature of the industry carried on in a given region also influences the density of its population. For example, in a pastoral life each shepherd may require many acres of land for his flocks; in an agricultural life each farmer may live comfortably on a few acres; while in crowded cities many thousands may live comfortably in a space where but few could live on farms. In cities, the people derive their food, clothing, and other necessities of life from all parts of the world, and pay for it by their labor.

Figure 10 indicates where the population is exceedingly dense, moderately dense, sparse, and practically uninhabited. The exceedingly dense populations of the world are found in the fertile valleys of the Yangtze, the Ganges, the Nile, and in parts of Europe and America in the large cities. Dense populations are found in the remaining parts of China and India, Europe, the United States, and parts of western Africa and South America near the coasts.

Influence of Physical Agents on Density of Population. — Unusual weather conditions, mighty convulsions of nature, and the existence of animal or vegetable pests have occasionally resulted

in the destruction of life or property, over more or less extensive areas. Such disturbances frequently unfit the areas so visited for the support of life, and thus disturb temporarily or permanently the distribution of population. The more important of these are as follows :—

Unusual frosts in tropical or subtropical countries may result in the destruction of coffee, tobacco, cotton, oranges, and other important tropical products. In the cultivation of certain of these crops the precaution is taken of sowing the seed in small spaces that can be protected, and later setting out the plants in the field, when the appearance of frost is improbable. The effect of such unusual frosts was shown in Florida in 1894-95 and 1899, when the orange groves through a large part of the state were practically destroyed.

High or unseasonable winds frequently beat off the blossoms from fruit trees, cotton plants, and coffee trees, and so prevent a large yield.

Hail storms are very destructive in some countries. In France they have at times occasioned much damage to the silk industry by destroying the leaves of the mulberry trees, on which the silk caterpillar feeds.

Droughts.—Where for any reason there is a lack of rainfall in districts that are usually well watered, a great loss may occur in the crops. And where, as in western Kansas and Nebraska, there are alternating periods of abundant and insufficient rainfall, even though these periods may extend through a number of years, agriculture without irrigation is a failure.

In densely populated countries, as China and India, especially where means of rapid transportation are inadequate, droughts causing a failure of the food crops result in a great loss of life, in some cases amounting to over a million people during a single drought.

Inundations.—On the other hand, too great a rainfall, by causing rivers to overflow, may be equally destructive. When such inundations occur in densely populated river plains, as China and India, the losses are great. Similar, though less severe, floods frequently occur in the valleys of the Mississippi and the Danube. Inundations may be caused also by the breaking down of sea walls, as in that of the Zuider Zee in 1876.

Volcanoes and earthquakes may cause great loss of life and property. An example of this is the terrible disaster at Martinique in 1902.

Vegetable pests, such as minute fungi, which cause the destruction of many agricultural crops, as, for example, rust in cereals, or mildew in grapevines, may occasion great loss.

Animal pests, such as swarms of locusts, grasshoppers, potato bugs, as well as immense numbers of army worms, rabbits, etc., often cause great damage to the crops.

Relation of Density of Population to Occupation. — In newly settled regions it is by no means a matter of choice what shall be the occupation of the greater part of the inhabitants. At the outset the population is small, and each family strives to meet all of its own needs. Gradually, as the population becomes denser, there comes a greater specialization of industry, until, when the whole of the country is occupied, it is found that certain parts of it are especially well suited to the development of special industries. This results in the partitioning of territory into well-marked industrial regions. The increase in population in these regions may then go on until the resources of the country are no longer able to support all of the people, and emigration begins.

Many things may arise to disturb industrial conditions, and consequently the population. Prominent among these is the discovery or development of new resources or the exhaustion of old ones.

Emigration. — Whenever the population of a country increases so rapidly that the natural resources of that country are unable to supply the necessary food, or the employments to earn food, or when the price paid for labor becomes much lower than that paid elsewhere, people emigrate and seek new homes. This has occurred mainly in the old countries of the world. Its people have sought new homes in sparsely settled countries where the soil is fertile and the land is cheap.

The highest civilization of the Old World is found in Europe, and for the past three hundred years civilized Europeans have been emigrating in great numbers to all parts of the earth. Such emigration, which has been enormous during the last half century, has now reached about three quarters of a million annually. The greater proportion of this emigration comes from the United Kingdom of Great Britain and Ireland, Germany, Russia, Italy, Austria-Hungary, Norway, and Sweden.

Emigration to the United States. — Of the emigrants from Europe nearly two thirds come to the United States. The

remainder go chiefly to South America, Canada, Australia, and Africa.

The greater part of the emigration to the United States and Canada has been from central and northern Europe, but in recent years the bulk of it has come from southern Europe. The migration to the United States during the last half century has been the greatest known in the history of the world. Within two generations nineteen million people have left their homes in Europe and have crossed the Atlantic to come and live in this country. The emigrants to Brazil and Argentina, which are the principal countries of South America that attract emigrants, come mainly from southern Europe, and consist largely of Italians, Spaniards, and Portuguese.

Government. — No matter what the general occupation of a community may be, the best results cannot be secured unless the government is strong enough to protect both life and property. That form of government is best which will do this in such a manner as to encroach least on the freedom, the individual rights, and the enterprise of the people.

The limits or boundaries of different countries are the result of purchase, conquests, or treaties with adjoining countries. Where oceans form one of the boundaries of a civilized country, the waters, for a distance of three miles from the coasts, are regarded as a part of the territorial limits. Outside of these limits lie the "*high seas*," where the only jurisdiction found is indicated by the flag under which each vessel sails. Portions of the sea, nearly inclosed by island chains, are, by treaties, regarded as belonging to the countries within which they lie.

Classification of Industries. — Many of the occupations in which the different peoples of the world are engaged are connected with obtaining the products of the soil, the forests, the waters, and the mines. These products in their natural state are the world's raw materials, and in their turn give occupation to the people who are engaged in their manufacture. Other occupations are connected with the transportation of the raw materials to the factories, and to the markets where the finished goods are sold; others, with the purchasing, selling, or exchanging either of the raw materials or the finished products. In addition to these are the callings that arise in connection with the various financial or banking institutions engaged in the

handling of the money required for the carrying on of the before-mentioned occupations, and those connected with the carrying on of government, education, and religion.

Agricultural and Pastoral Pursuits include the cultivation of the soil and the raising of domestic animals, together with such other animals as the bee and the silkworm. It has been estimated that agricultural pursuits afford employment for nearly one half of the wage earners of the world. In this way are procured nearly all the food products of the world, and also the principal products from which various fibers are obtained for the manufacture of textile fabrics, ropes, cordage, etc. Figure 7 (p. 26) shows the regions where cultivable and pastoral lands predominate. It should not be forgotten, however, that while agriculture is confined to the cultivable lands, pastoral pursuits can be followed both on cultivable and pastoral lands.

Lumbering. — Forests are the chief source both of lumber and firewood. The trunks of trees are known as *timber*. When sawn into boards they are called *lumber*. Forests give employment to woodcutters, to the many people engaged in sawmills, where the timber is made into lumber, etc., as well as to those employed in the manufactories, where furniture and other useful articles are made.

Fisheries. — The products of the water are not so valuable as those either of the soil or of the forests, yet from them come very valuable food supplies. Fishing industries are carried on to some extent in nearly all inland waters, but are especially followed in the shallow waters of the ocean on the borders of continents and islands. The most valuable of the shallow water fisheries are those found off the coast of North America, Europe, and eastern Asia. Very little fishing is carried on in the deeper waters of the ocean, with the exception of the pursuit of whales.

Hunting. — Comparatively few people are regularly engaged in hunting. By means of it, however, are obtained valuable products from wild animals, such as furs, hides, ivory, feathers, etc.

Mining Industries. — The mining industries are very extensive and valuable, particularly those connected with coal, iron ore,

petroleum, and copper. These, together with the industries involved in the preparation of the mined products for the use of the manufacturers, furnish employment for great numbers of people. The production of useful minerals has enormously increased, both as to value and amount, in all parts of the world during the last few years. As the industry grows, the number of people employed increases.

Transportation Industries. — These also afford occupation for a great number of people. The wagon roads give employment to carriers, drivers, teamsters; the railroads, to conductors, engineers, firemen, brakemen, signal men, telegraphers, and section men, not to speak of a vast army of clerks, etc.; and both of these give employment to expressmen. Inland and ocean navigation systems employ canal men, sailors, navigators, pilots, stevedores, engineers, firemen, and deck hands.

Other Industries. — Other occupations, connected with manufacturing, finance, government, education, and religion, will be considered in another place.

Cities and Towns are limited areas in which the population is exceptionally dense. The inhabitants of cities and towns are occupied chiefly in commerce and manufacture. Cities are the commercial and manufacturing centers of the world. The growth of nearly all cities is due to the fact that certain sites are peculiarly valuable as commercial centers on account of their ready accessibility or as manufacturing centers because of their nearness to power, raw materials, or transportation facilities.

Some Sites Favorable for the Location of Large Cities.

(1) *On the banks of navigable rivers*, because these form the natural trade routes of a country. Points at or near the confluence of rivers are especially favorable, and this is true even when one of the rivers is not navigable, because its valley forms a natural route for highways, railroads, or canals. St. Louis and Albany are examples of such cities.

(2) *Points where merchandise must be reshipped from one kind of transportation route to another.* Examples of such sites are ;

(a) At or near the head of navigation of navigable rivers, as St. Paul, Montreal, and Troy. (b) At or near the extremities of lakes or arms of the sea, as Chicago, Duluth, Toledo, Buffalo, Philadelphia, and Baltimore. (c) At the great bends of navigable rivers, such as Kazan on the Volga, Timbaktu, and Cincinnati.

(3) *Where two or more important trade routes cross*, as Paris and Vienna.

(4) *At or near the mouths of navigable rivers or bays*, as Norfolk, Havre, Danzig, Bremen, Hamburg, and New Orleans.

(5) *At falls or rapids of streams* where water power for manufacturing is available, as Rochester, Lowell, Paterson, Louisville, Richmond, and Minneapolis.

(6) *At a central position in a fertile region*, such as Indianapolis, Moscow, and Berlin.

(7) *At a central position in a mining district*, as Johannesburg, Pittsburg, and Scranton.

(8) *At large and deep harbors*, as Liverpool, New York, and Boston.

Some very Advantageous Sites for Cities. — At certain points along the Atlantic coast of the United States, and to an almost equal degree in many other parts of the world, the location is so favorable that numerous large cities have sprung up in the immediate vicinity of one another. For example, around Boston we have Chelsea, Cambridge, Salem, Lynn, Somerville, Quincy, etc.; around New York City we have Jersey City, Newark, Paterson, Yonkers, Elizabeth, Orange, Rahway; and around Pittsburg we have Allegheny, Braddock, Beaver, McKeesport, Homestead, and Carnegie. In some cases it has been found convenient to unite these outlying towns under one corporate government, as was done with certain cities and towns to form Greater New York.

CHAPTER V

MANUFACTURING FACILITIES

Raw Materials, and their Manufacture. — The term *raw materials* is used to describe any product in its natural state, from whatever source obtained. Including as this does products from all three kingdoms, the animal, the vegetable, and the mineral, there is necessarily a very great variety.

The following may be mentioned as typical. From the animal kingdom we get fur, flesh, hides, oils, fats, ivory, hair, and feathers; from the vegetable kingdom we get the products of the forest and the orchard, wheat, rye, oats, corn, barley, sugar cane, tobacco, coffee, tea, and rice; and from the mineral kingdom we get the various metallic ores, coal, limestone, building stone, and phosphate rocks.

Some raw materials enter into commerce and are consumed as such, while many others are subjected to some process of manufacture before being consumed.

The Manufacture of some Raw Materials from the Farm. — Wheat, rye, oats, barley, and corn are manufactured into flour and meal, or the corn, rye, and barley may be manufactured into whisky, ale, beer, porter, etc. The wheat straw may be manufactured into straw braid for hats and bonnets, or into straw paper or paper pulp and strawboard. The milk from the dairy is manufactured into butter, cheese, etc.

The Manufacture of some Raw Materials from the Plantation. — Tobacco is manufactured into plug tobacco, cigars, etc.; and cacao into chocolate. Sugar cane or sugar beet is the raw material of sugar. It is usually converted at or near the plantation into a semi-raw material called *raw sugar*. This goes to

the *sugar refineries*, where it is converted into white and loaf sugar. Tea is cured and rolled for the market; rubber is purified and formed into various shapes, such as tubes, hose, cloth; or it is combined with sulphur and vulcanized for various purposes in the arts.



FIG. 11. — Sugar Refineries, Brooklyn.

The Manufacture of some Raw Materials from Animals. — Furs are cured and dried, and converted into garments; or the hair is cut and made into felt. The flesh of animals is dressed into fresh meats ready for the consumer, or canned, salted, dried, pickled, or refrigerated, so as to be fit for transportation to a great distance. From the hides of the animals leather is tanned. The leather in its turn forms the material employed in the manufacture of shoes, harness, belting, etc. The scraps of leather are then either converted into a material known as *leather board*, and employed as a cheap substitute for leather, or they go to the chemist, who makes them into a cheap article used instead of indigo blue. The oils and fats of the animals are manufactured into soaps or candles, are refined for lubricating oils, or are converted into lard and artificial butter. At the same time the hair and bristles are manufactured into brushes, or into haircloth. Still other

parts of the animal are employed for the manufacture of glue, etc.

The Manufacture of some Raw Materials from the Waters.— Fish are either employed directly for food, or are sent to the canneries, where they are canned for shipment to other parts of the world; or the fish are dried, salted, or pickled for the same purpose. Much of this product is used also in the manufacture of fertilizers.

The Manufacture of some Raw Materials from the Forests.— The timber is manufactured into boards, beams, posts, laths, and railroad ties. The boards are converted into window and door frames, sashes, mantelpieces, or furniture. The bark of certain trees is ground and used in tanning leather. The wood from other trees is reduced to wood pulp which is used in the manufacture of paper.

The Manufacture of some Raw Materials from the Mines.— These constitute a great variety of substances, including bituminous and anthracite coal, and a variety of ores. Though coal is extensively used as a raw material in the manufacture of illuminating gas and its by-products, its vastly more important use in manufacturing is as a fuel in producing steam, and with certain fluxes, such as limestone, in reducing the ores, that is, in obtaining the metals from the ores. Bituminous coal, when used for this purpose, is first changed into coke. The limestone may be changed into forms suitable for use as a fertilizer, as mortar, as plaster of Paris, or as hydraulic cement. Phosphate rock also makes an excellent fertilizer. The various ores are reduced in smelting furnaces, leacheries, concentrators, stamp mills, etc., to approximately pure metals.

One raw material often supplies many kinds of manufactories, as iron ore, for example. Pig iron is converted at the *puddling furnaces* into wrought iron. It is changed by the acid and basic *Bessemer* process, or by other processes, into steel. In the *rolling mills* the wrought iron or steel is formed into what is called *structural steel*, such as bars, rods, beams, etc. From some of these products of iron ore, other manufacturers make ships, boats, bridges, locomotives, steam engines, car wheels, plows, harrows, freight cars, cutlery, needles, etc.

By-products. — A great store has recently been added to the world's wealth by the discovery of methods of utilizing the wastes of manufacture. The original spur to such inventions came from a desire for more economical means of removing the waste, but experimentation led to the discovery of "by-products," some of which, when fully exploited, were found to exceed the staple articles in value.

The coal-tar waste, in the manufacture of gas from coal, was formerly allowed to pollute the streams until laws were passed to prohibit the practice. Then the tar was consumed in furnaces constructed at great cost, till chemistry came to the aid and produced from it such valuable by-products as benzine, carbolic acid, aniline, as well as anthracene and naphthalene from which madder and indigo dyes are made. England had a similar experience in the manufacture of soda. The gas from the factories was so fatal to the neighboring vegetation that the companies were compelled by law to devise means to prevent its escape. Absorption of the gas in water produced hydrochloric acid, for which there was no market and which was as troublesome to remove as the gas. Chemical experiment soon led to the discovery of a method of reducing the acid to bleaching salt, which lowered both the price of bleaching salt and of soda. Although two thirds of the contents of the cotton boll is seed, and only one third fiber, the problem formerly was simply how to get rid of the waste seed most economically. Now a valuable oil is produced from the cotton seed, and the cake from which the oil is pressed is used as food for cattle and as a fertilizer; while the sludge which settles at the bottom of the oil tanks is used for making soap. Agriculture has made great strides through the discovery that the materials most needed to restore exhausted soils may be easily procured from the wastes of various manufacturing industries.

The Cost of Manufactured Articles depends largely on :—

- (1) The cost of the raw materials at the place of manufacture.
- (2) The cost of the labor.
- (3) The cost of the power required to drive the machinery.
- (4) The cost of getting the finished product to the market.
- (5) The cost of interest on capital invested in the plant.

Manufacturing Sites are located usually :—

- (1) Where raw materials can be obtained cheaply.
- (2) Where a plentiful supply of skilled labor exists.
- (3) Where coal is plentiful, so as to insure cheap power; or where water power or electric power can be obtained.

(4) Where the markets in which the goods are to be sold are close at hand, or are accessible at low cost of transportation.

Influence of Supply of Raw Materials on the Location of Manufacturing Sites. — A manufacturing site should, when possible, be near the district from which it draws its raw materials ; for example, the largest flour mills of the United States are situated in Minnesota, in the heart of the wheat region.

Sometimes, when more than one kind of raw material is required, as in the manufacture of iron and steel, in which ore, coal, and limestone are all needed, it is found more advantageous to locate the furnaces and mills near the coal district, especially if limestone also can be obtained there, and to carry the iron ores to the furnaces by some cheap method of transportation. Thus in the vicinity of Pittsburg and Chicago, extensive iron and steel manufactories have been located. Coal and limestone can be had there in abundance, and the iron ores from Michigan, Minnesota, and Wisconsin can be readily brought to points not far from the furnaces by way of the Great Lakes.

Influence of the Supply of Skilled Labor on the Location of Manufacturing Sites. — The character and cost of production of any article manufactured must be such as to enable it to be sold in the open market in competition with similar articles, at a profit to the manufacturer. Hence skilled laborers, who may be employed for reasonable wages, are necessary to the success of any manufacturing industry. Even though manufacturing plants are located, at the outset, in sparsely populated districts, yet the number of inhabitants will rapidly increase, because there labor can find remunerative employment.

Influence of Cheap Power on the Location of Manufacturing Sites. — Since power is required to drive the machinery of manufacturing plants, a necessary condition in the location of such plants is that they shall be in the neighborhood of cheap power. Consequently, regions where coal is cheap or water power abundant are likely to become manufacturing centers.

During comparatively recent times electrical transmission of power has made it possible to locate manufacturing plants at considerable distances from the centers of power. An excellent example of this is found in western New York, where thousands of horse power are transmitted about eighteen miles

from the power plant at Niagara Falls to the city of Buffalo. At one place on the Pacific coast of the United States electrical power is transmitted some 220 miles from its point of generation.

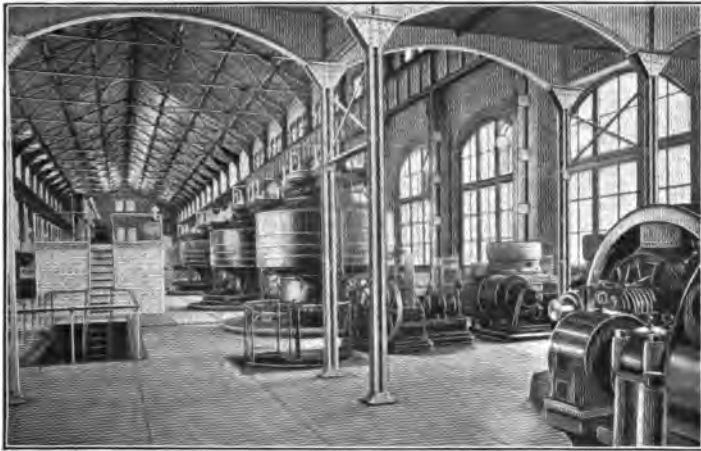


FIG. 12. — Electric Power Plant, Niagara Falls.

Influence of Accessible Markets on Location of Manufacturing Sites. — Not only should manufacturing plants be situated in regions where they are accessible to supplies of raw material, but they should also either be situated near good markets, or be accessible to them by cheap transportation.

In some instances, where large markets have changed their location with the movements of the population, manufacturing industries have been abandoned in one place and built up in another. The great flour mills of the United States were originally situated in the eastern part of the country, but as the density of population increased toward the west, these manufactories found it advantageous to move to Minnesota, where they would be nearer the source of the raw material (wheat). In districts characterized by extensive textile manufactories, there will generally be found chemical plants that produce the dyes, bleaching salts, and other materials employed by such industries.

The Influence of Physical Conditions on Manufacturing Sites is seen in the existence of natural water power in certain regions; for example, on the Atlantic slope from New York southwestward the streams cross to the coast plain from the foothill region of

the mountains in rapids or waterfalls. This series of water powers has determined the locations of a line of manufacturing centers extending from New Jersey to Alabama, including Trenton, Richmond, Weldon, Columbia, Augusta, and Macon.

Value of Machinery in Manufacturing. — By the use of machinery it is possible to produce goods at less expense than without its aid. Saving is thus effected along two lines; first, by lessening the amount of human labor required, and second, by increasing the number of articles produced in a given time. Another fact which also should be taken into account is that machine-made goods are frequently of a finer and more excellent quality than the hand-made goods which they have displaced.

Take, for example, the machinery employed in cotton mills. By the use of such machinery, cotton goods can be produced far more cheaply than by the old method of hand spinning and weaving. Instead of picking the seeds from the cotton by hand, as was formerly done, the *cotton gin* now does the work more thoroughly and in less than one fiftieth of the time. Instead of the old method of hand spinning, the invention of the *spinning mule* enables a single operator to attend to hundreds of separate spindles; and by employing machinery for driving the looms, the product is improved in quality and vastly increased in quantity.

The cheapening of manufactured articles by the use of modern machinery is well seen in the case of articles made of iron and steel. Such great improvements have been made in machinery for mining the iron ore, for loading it on boats, for transporting it to the furnaces, for unloading the boats and placing the iron in the furnaces, and in the construction and operation of the furnace itself, as well as in the processes subsequently employed for converting the iron into steel, that the cost has been greatly reduced. To-day steel is largely employed in the manufacture of freight cars, ships and boats, in the building of bridges, in the framework of tall buildings, and for numerous other purposes for which its use, a short time ago, would have been impossible on account of its cost.

Effect of Machinery on Labor. — When steam-driven machinery was first introduced, it was thought that it would reduce the price of labor by reducing the opportunity that labor had for finding employment. It was argued that if a machine with one or two operators could replace the labor of a large number of men, many people would find no employment. It was soon found, however, that the lessening of the cost of production put within the reach of all what was formerly used only by the wealthy, and thereby so greatly increased the market for the goods that, in reality, a greater demand than ever existed

for labor. The general substitution of machines for hand labor increases the proportion of the total population engaged in manufacturing industries, and such industries, more than others, develop intelligence in the laborers. This increase in the quality of the laborers is naturally attended by an increase in wages.

Division of Labor. — The necessity for obtaining skilled labor to operate machinery has naturally led to a division of labor. Instead of having a single hand produce a finished product, it is found that both a cheaper and a better product can be produced by dividing this operation among a number of separate hands; for in this way each operator becomes more skilled in performing the limited work assigned to him.

Division of labor is carried on to such an extent that a factory equipped with the most improved machinery employs a great number of hands to produce an article that was formerly made by a single laborer. An example of this is found in the manufacture of shoes, where a single shoe passes successively through a number of machines, each of which is under the direction of a skilled operator. The advantages derived from a division of labor are not difficult to understand. It is evidently much better for the farmer to obtain his clothing and boots by the indirect exchange of his farm products, than to spin, dye, and weave his own wool, to make his clothing, and to tan leather to make his own boots.

Capital. — A mistaken idea sometimes prevails that continuous production can be carried on successfully by labor alone. This is not the case. A man must have the use of some accumulated wealth while he is engaged in working. He must have food and shelter and clothing and tools and machinery before the result of his labor becomes available. Accumulated wealth devoted to the production of further wealth is called *capital*, and it is as important as labor in the continuous production of wealth.

The construction and equipment of a large manufacturing plant necessitate the expenditure of much money. Manufactories also require the expenditure of considerable capital for their maintenance, to pay for the raw materials and labor necessary for carrying on the different processes. Large manufactories, therefore, involve the use of considerable capital, and the manufactured products which they produce are to be regarded as the result of an expenditure of both capital and labor.

Some of the Principal Manufacturing Countries in the World. — The principal manufacturing regions of the world are in the United States and northern Europe. The United States is by far the greatest manufacturing nation in the world, not only as regards the total value of its products, but also in the product for each inhabitant. Of the European countries Great Britain is the greatest manufacturing nation, both in the total amount of the product, and in the product per inhabitant. Germany comes next, as far as the total product is concerned; but is exceeded in the product per inhabitant by both Belgium and Denmark. France is third in the total product.

It is on account of the almost universal use of machinery in the United States that the American artisan is, on the whole, far more efficient than the European. Since one man can make a greater number of articles in a given time with a machine than without one, he must necessarily command higher wages, but at the same time the cost of the labor on each article is less. In Great Britain and Germany, though machinery is used to a great extent, yet it is not so generally employed as in the United States. Consequently wages there, as a rule, are less.



FIG. 13. — Harvesting by Hand in France.

Labor. — The quality and character of labor, and consequently the wages paid for labor, depend largely on the degree of civili

zation ; that is, on intelligence. Highly civilized nations produce the most skilled and intelligent laborers, who necessarily command the highest wages. The efficiency and skill of laborers



FIG. 14. — Harvesting by Machinery in United States.

in the United States compare favorably with those of any other part of the world. Australia and Canada, peopled largely by the Anglo-Saxons, also stand very high in this respect. Skilled labor is abundant also in Great Britain, Denmark, France, and Belgium. In other parts of the world, such as Central America and South America, Portugal, Spain, Italy, and Russia, the efficiency of labor is less.

In farming districts, wherever the land is cheap and labor dear, it is true economy to save labor as far as possible by employing agricultural machinery. This is done to a great extent in the United States, where most of the processes required in farming, such as the breaking of the ground, seeding, cultivating, reaping, and thrashing, are thus carried on. In this way large crops are produced by a few hands ; or, in other words, a high efficiency of human labor is insured. In more densely populated countries, where the farms are small and labor is comparatively cheap, machinery is not employed to such an extent as in the United States and elsewhere. At the same time improved methods of farming are used, by means of which larger crops per acre are often obtained in such areas than in the United States.

CHAPTER VI

TRANSPORTATION FACILITIES

Effect of Transportation Facilities on the Cost of Articles. —

Where the transportation facilities are poor there is a great difference between the cost of articles produced in the neighborhood and those produced at a distance. As the means of communication improve and the cost of carrying goods is lessened, the price asked for imported goods decreases. At the same time local products become more valuable because they are accessible to a larger market. Among people so situated as to profit by the new conditions, important industrial changes take place, chief among them being a decided increase in local production of all kinds for which an outside market has been found.

A recent example of such industrial changes is found in the mountainous districts of southwestern Virginia and eastern Kentucky. Before railroads had reached this region the price of all local produce, as eggs, chickens, hogs, etc., was very low, while the price of everything brought in from the outside was very high. Since the advent of railroads the produce of the region reaches a wider market, is in greater demand, and therefore commands higher prices, while goods from outside are brought in more cheaply and consequently can be sold for a lower price.

Transportation Facilities Necessary for Extended Commerce. —

Extended commerce is impossible unless transportation facilities are such that raw materials may readily be sent to manufacturers, and the manufactured products to their various markets. In order best to promote commercial development, transportation must be cheap, reliable, and rapid: cheap, because if the cost of transportation is excessive, the goods will be unable to

meet the competition in the markets to which they are sent; reliable, because if not, goods will be sent only to those points where the market price is high enough to cover the increased risk; and rapid, because otherwise perishable goods cannot be sent at all.

For this reason efforts are constantly being made to perfect all means of transportation. In most countries the general government, and in our own country many of the state governments as well, are promoting by every means in their power the building of good roads. At the same time railroad companies are constantly increasing the efficiency of their service by the use of more and more powerful locomotives, the reduction of grades, and the elimination of curves wherever possible. On the ocean large and powerful steamships have to a great extent replaced the old-fashioned sailing vessels, though for some purposes sailing vessels are still employed.

Where transportation facilities are in a primitive condition, as, for example, where the commercial products must be carried on the backs of men or by beasts of burden, commerce is necessarily limited. In the mining districts of the western part of the United States this kind of transportation was necessary in the beginning; but as soon as business developed, the towns were connected with the rest of the country by means of good roads, or by railroads; and their business and population rapidly increased.

In every civilized country, wagon roads have been established between different parts of the country. These roads connect with systems of railroads, so that it is an easy matter to carry the articles of commerce rapidly from place to place. It is not the function of wagon roads to transport articles long distances, but to carry them from the farm, the factory, or the dwelling house to the nearest railroad station. They are the feeders of the railroads.

Influence of Physical Features on Transportation Routes. — Generally speaking, transportation routes follow the shortest possible line between the settlements whose needs they serve. The physical features of the country traversed, however, play a very important part in determining their exact location. In crossing hilly or mountainous countries it is sometimes necessary to make detours in order to use low passes and avoid heavy grades and expensive tunneling, trestle work, and bridge

building. Only in level, open regions, like the great plains in the central part and the coastal plain in the eastern part of the United States, are straight lines even approximated.

On the ocean, in the days of the sailing vessels, routes were so planned as to take advantage of the prevailing winds and ocean currents; and with their help long distances round about were covered in less time than the shorter and more direct routes without these aids. In this day of steamships more direct routes are followed, though even now it is found desirable, in order to avoid storm paths, and for many other reasons, to hold to well-defined routes, even though they are not always the most direct.

As transportation routes are developed to meet definite needs, so they change in character and efficiency when such changes are found to be desirable and profitable. In the navigation of streams in a newly settled region, rudely constructed canoes and rafts are first employed, to be followed in turn, as settlement increases, by flat-bottomed boats and river steamers. The increased draught of the steamers makes necessary the survey of the stream, the dredging of a channel, the building of docks, and the locating of such signals as are needed for the guidance of pilots. While these changes are going on, other methods of transportation are introduced and go through their adjustment to the changing conditions.

Land Transportation. — Among the land routes of transportation the following, because of their general use, are worthy of notice: (1) trails, (2) roads, and (3) steam and electric railways.

Trails. — The simplest transportation route is a mere footpath or trail, following the natural surface of the country, and crossing the streams at good fording places. These trails are frequently mere portages by which a canoe may be carried from one stream or lake to another. They are usually very narrow and are used chiefly by man and by the more sure-footed among the beasts of burden. Because transportation over trails is so slow, and often dangerous, and because only small burdens can

be carried, the cost is high, so that only valuable commodities can be profitably handled.

Where the trail permits, the porters are replaced by beasts of burden. Asses and mules are especially noted for their endurance and sure-footedness, and are, therefore, peculiarly adapted for mountainous districts. *Llamas* are employed to carry ores from the Andean mines to the towns or seacoast. The *yak*, a variety of oxen, and *mountain sheep*, are employed as the beasts of burden in the defiles of the Himalayas and neighboring mountains.

Roads and Highways.—The better and more open trails pass by almost imperceptible degrees into the poorer roads, which come to displace the trails as settlement increases. Gradually a greater amount of care is given to the construction and maintenance of roads. The grade of the roadbed is made more nearly uniform by sinking it in a cut through the hills and by raising it on an embankment over the valleys, and streams are crossed by bridges. Finally, when the results to be secured seem to justify the expense, a carefully constructed roadbed of broken stone and other materials is laid so as to produce a hard, smooth surface, over which wheeled carts or wagons can be readily drawn. Care, too, is taken that the rain water shall readily drain off the surface of the road, and thereby avoid the cutting or irregular wearing due to running water.

In a well-constructed road it is important that the *gradient* shall not exceed a certain small amount, say 1 in 30 ; that is, the road shall not rise more than 1 foot in every 30 feet. Steep gradients are obviously objectionable.

Railroads.—For land transportation, railroads are very generally employed. The grading and preparation of the roadbed, the construction of bridges over streams, and viaducts over the railway itself, are all matters of great importance. Changes in direction are made by means of easy curves, and while the general direction depends, of course, on the places to be connected, it is usually found more convenient to follow the river valleys, cutting or tunneling the mountains near the watersheds. The gradients are far less than in ordinary roads, say about 1

to 80 or 100, though with powerful locomotives, steeper gradients can be overcome. In all cases, however, the grade is kept as low as practicable, in order to secure the greatest traffic capacity of the railroad, at the least operating expense.

Construction of Railroads. — Steel rails are generally used for the tracks. These are laid on transverse wooden ties about 2 feet apart, to which they are attached by spikes. Adjacent rails



FIG. 15. — Railroad Terminal.

are connected at their ends by means of iron or steel plates, bolted to the rails. The space between the ties is filled with *ballast* of broken stone, or other material.

In the modern railroad, speed is a matter of the greatest importance. Consequently everything is done to avoid unnecessary delays. Supplies of coal and water for the locomotive are placed at suitable intervals alongside the tracks in bins and water tanks. The locomotives of the fastest trains replenish their supply of water without stopping, by taking it up from a long metallic water trough placed between the rails. In regions where heavy snowfalls are apt to obstruct the trains, as in some of the western portions of the United States, the tracks are sheltered by *snowsheds* built over them. In other regions fences are built along the railroad to keep the snow from drifting on the track.

In order to keep the different parts of the track in good condition, the road is divided into short *sections*. Each section is placed in charge of a foreman with a gang of men, whose duty it is to patrol this portion of the road and keep it in good repair.

Safety Devices for Railroads. — To insure safety, trains are equipped with *hand* or *air brakes*, and the more important lines with *safety signal systems*. On roads where traffic is heavy the danger of rear-end collisions is lessened by dividing the road into a number of *blocks* or *sections*, and so maintaining telegraph connection between towers located at the ends of such blocks as to prevent, by the display of suitable signals, more than one train or engine from being on the same track in the same block at the same time.

The method most generally employed for signaling a moving train is by means of a device called the *semaphore*, consisting of a wooden blade or arm about 6 feet in length and 1 foot wide, pivoted on a post about 12 feet high. The operator in charge of the signal tower controls the semaphore arm either by means of compressed air, by electricity, or by mechanical force, each block of the road being provided with a number of signals. When a train enters a block, the signals at the ends of the block automatically indicate danger until the train enters another block and thus leaves the first block clear. As soon as a block is clear, the movable semaphore arm is placed pointing downward at an angle of about 75° with the horizontal. During night, when the semaphore arm cannot be seen, its different positions are indicated by colored lights. When a block is not clear, the arm or blade of the semaphore is placed in a horizontal position by day, or displays a red light by night. In large signal stations, from which many tracks are to be controlled, all the switch signals are operated from a single tower. This tower contains means for moving the switches, together with devices for so interlocking them that no semaphore or switch can be moved until all others which might conflict with it are in proper positions.

First-class Passenger Trains. — Most first-class passenger trains in the United States are lighted by gas or electricity, and are provided with dining, sleeping, and parlor cars. In this country practically all passenger trains and most first-class freight trains are provided with *air brakes*, by means of which the train can be quickly stopped should the necessity arise. Most trains in this country are provided also with *automatic*

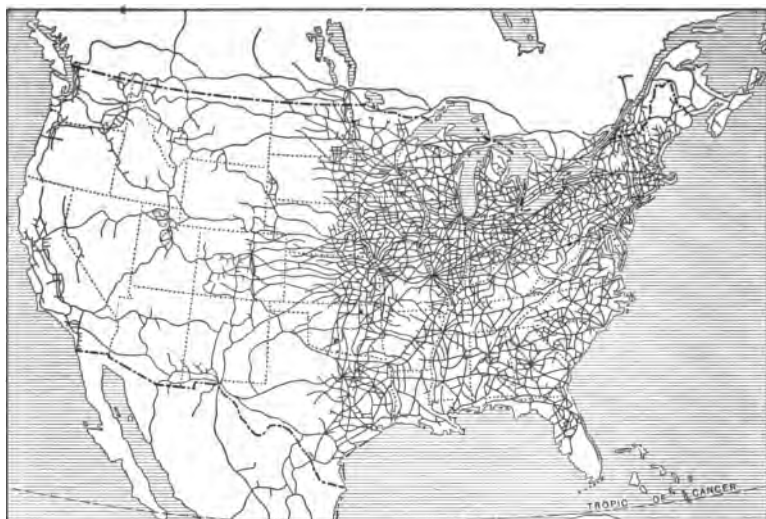


FIG. 16.— Relative Density of Railroads in United States and Europe.

coupling devices, by which the cars will couple together by merely striking each other end on.

High rates of speed are obtained by American and English trains, varying from 40 to 60 miles per hour, counting all stops. Fast freight trains carrying perishable materials also run at high speed, though somewhat less than passenger trains.

Railway Ownership and Control.—In Germany and some other European countries the governments generally own the railroads. In the United States the railroads are owned by private corporations, which obtain charters for operating their roads from the states through which they pass. The state reserves the right to pass laws governing the charges for fares and freights. An Interstate Commerce Commission is appointed by the executive department of the United States for the purpose of regulating the charges of railroads that run through more than a single state, so as to prevent unjust discrimination in favor of certain places or firms.

Improvements in Railroads, Lowering of Freight Rates.—Improvements are constantly being made in railroad transportation through the consolidation of several companies into a single large company or corporation. Such corporations, by straightening railroad lines, lessening grades, improving rolling stock, and introducing the most modern railroad safety devices, have been able to decrease the charge for freight and passenger service; and at the same time to give better service, both as regards speed and safety. In the United States the average charge per passenger per mile is somewhat over 2 cents, while the charge per ton of freight per mile is about .07 cent. For example, flour can be hauled from Chicago to New York for about 70 cents per barrel. In most parts of continental Europe such charges are somewhat higher.

The railways of the world have a total length of over 500,000 miles. Of these the United States has over 200,000 miles, or 40 per cent of the whole.

The railroad mileage of the different nations are given in Table II, p. 412.

In comparing the different countries of the world as regards their railroad facilities, it is advisable to use for each country its railroad mileage per 100 square miles of its area, as indicated in Table II, p. 412.

The countries of western Europe are provided with a close network of railroads, while those of eastern Europe, which are less densely settled, have poorer railroad facilities. The north-eastern quarter of the United States has excellent railroad facilities. The southeastern quarter and the western half are not so well equipped.

Electric Traction. — Electricity is now coming into rather general use as a motive power, and many electric railways are being built in various parts of the world. The electric current required is taken from a wire suspended over the cars, or placed in a slotted conduit beneath the tracks, or carried by a third rail.

Governmental Aid to Public Works. — The construction of the roads, railroads, bridges, canals, wharves and docks, harbors, etc., required for commerce, necessitates the expenditure of considerable capital; and, since such investments are not, as a rule, immediately or directly profitable, they are often constructed with government aid, and paid for by the public, in the shape of taxes, dues, tolls, or general charges. Most railroads in this country east of the Mississippi, however, have been built by corporations under state authority.

Transportation on Deserts. — For desert regions the *camel*, justly called the "ship of the desert," is almost universally employed, both on account of the heavy load it can carry (from about 500 to 1000 pounds), and from its ability to go for long periods of time with little food and no water. There are two species of the camel, one, the two-humped or Bactrian camel, — a slow but strong animal, — and a smaller species, the one-humped or Arabian camel. One variety of this species, the dromedary, employed to carry people only, can travel a hundred miles a day.

Caravans of travelers, banded together for convenience and protection, constitute the means by which transportation is effected across the deserts of Africa and Asia.

Other Beasts of Burden.—On the plains of India the *ox* is used to draw wheeled vehicles. In some regions *elephants* are used, but, besides their greater first cost, they require more food than other animals in proportion to the work accomplished.

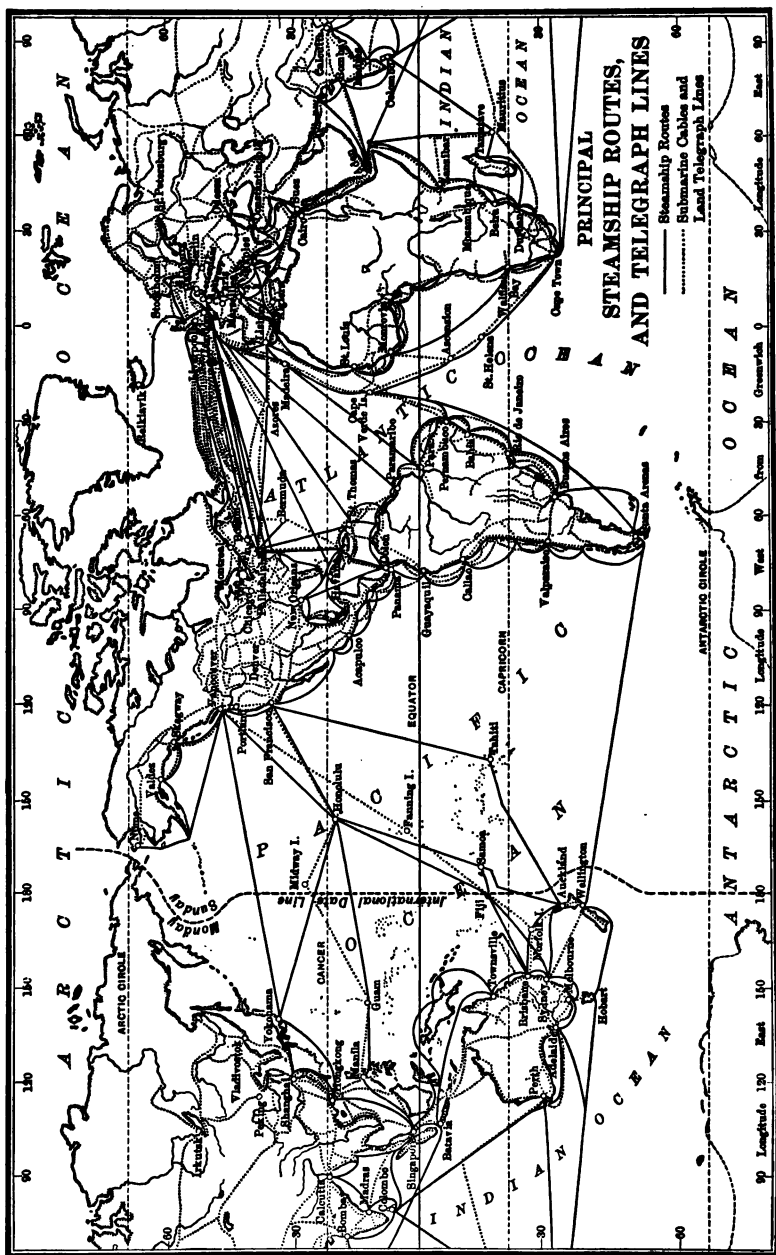


FIG. 17.—A Caravan.

Transportation in Arctic Climates.—In the Arctic regions where the ground is usually covered with ice and snow, sledges, drawn by *dogs* or by *reindeer*, are used. In Canada and Russia sleighs are drawn by *horses* over the snow or ice.

Water Transportation includes both oceanic and inland navigation and is carried on by means of steamships, sailing vessels, barges, and canal boats.

Tonnage.—The tonnage of a ship is its carrying capacity or weight expressed in tons. *Gross tonnage* is found by reckoning one ton to every 100 cubic feet of capacity of a vessel; *net tonnage* is derived from gross tonnage by deducting from it the spaces not utilizable for cargo or passengers; *deadweight tonnage* is the actual weight of cargo that can be carried without immersing a vessel too deeply for safety; *displacement tonnage* is the weight of ship and contents when immersed to some fixed depth. The depth to which a vessel sinks in water is called its *draught*.



Ships, Construction and Propulsion. — In nearly all recent ship construction steel is used in place of wood. Ships built of steel can be made much lighter for the same strength than those built of wood; steel can be made into plates or beams of almost any size and shape, thus permitting the number of joints to be decreased, and decreasing the chance of leakage; and machinery can be more extensively used in their construction, and thus better and cheaper ships can be built.

The holds of large modern vessels are generally divided into different *compartments by vertical water-tight partitions or bulkheads*. If one of these compartments is filled with water the buoyancy due to the other empty compartments will keep the ship from sinking. When the weight of the freight is not enough to give sufficient draught for safety, water is employed for ballast, the modern steamship being provided with double bottoms between which the water can readily be introduced for ballast.

Practically all large modern ocean-going vessels are now propelled by steam. This is a vast improvement over propulsion by the wind, because it permits of greater speed and insures greater regularity in the time of each voyage. There are, however, many sailing vessels still employed in commerce. While the introduction of high speed in the steamers requires a greater consumption of coal, this has been in part offset by lightening the hulls by the use of steel and of improved engines.

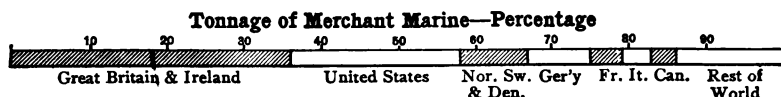


FIG. 19.

The paddle wheels originally employed on ocean steamers are now replaced by the screw propellers, either single or combined. The use of screw propellers and of higher steam pressures has brought about greatly increased speed.

A constant increase in the size of vessels employed has also been going on. All these improvements have reduced the cost of ocean transportation.

Fig. 19 shows the tonnage of shipping of the chief ship-owning countries of the world.

Ocean Routes. — Some of the principal ocean trade routes, indicated by lines drawn directly from port to port, are shown in Fig. 18. It is, of course, impossible to show more than the

principal routes or to indicate the relative importance of those which are shown. By far the most important one is that across the Atlantic between New York and Liverpool.

Inland Navigation. Government Improvements. — The influence exerted on commerce by cheap transportation facilities is so great that the government of every civilized country of the world has expended vast sums of money in the improvement of its internal waterways and harbor facilities. Among the more important of these improvements may be mentioned the construction of canals around falls and rapids, the deepening and straightening of river courses, the dredging of harbors, and the building of breakwaters for their protection. The amount expended annually by the United States for the improvement of rivers and harbors varies greatly, but in the five years, 1900-4, about \$100,000,000 were devoted to this purpose.

This work has been done in an especially able manner in Europe. The Clyde has been transformed into a navigable stream capable of floating the largest ocean steamships, and this has made possible the great shipbuilding industry of Glasgow. The river Po has been confined for centuries between artificial river banks. The Thames has been deepened to Tilbury, twenty miles below London, to admit the largest vessels; and the Seine, the Rhine, the Danube, and many others have been provided with canals wherever the navigation of the rivers has rendered them necessary.

The navigation of the Mississippi River has been improved by the construction of jetties extending its banks, at its mouth, out to deep water in the Gulf of Mexico. The jetties have caused the river to cut away its bar, and have so increased its depth that seagoing vessels go up the river to New Orleans.

Seawalls, breakwaters, and jetties have been constructed in many places along the coast of the United States. Notable examples are those at Galveston, Cape Henlopen, and at the mouth of the Columbia River.

Canals. — In spite of rapid development in the railway carrying trade during recent years, many canals retain their early importance, and, to a limited extent, canal construction is still going on. Probably the most valuable canals at the present time are the ones by means of which some obstruction to the free navigation of inland waters is overcome. North America has many notable examples of such canals, among which may

be mentioned the American and Canadian ship canals at Sault Ste. Marie, built around the rapids of St. Mary's River, and the Welland Canal connecting Lakes Erie and Ontario, necessitated by Niagara Falls. Other important examples are mentioned on p. 68.

In many of the European countries canal construction has been carried on both to a greater extent and more intelligently

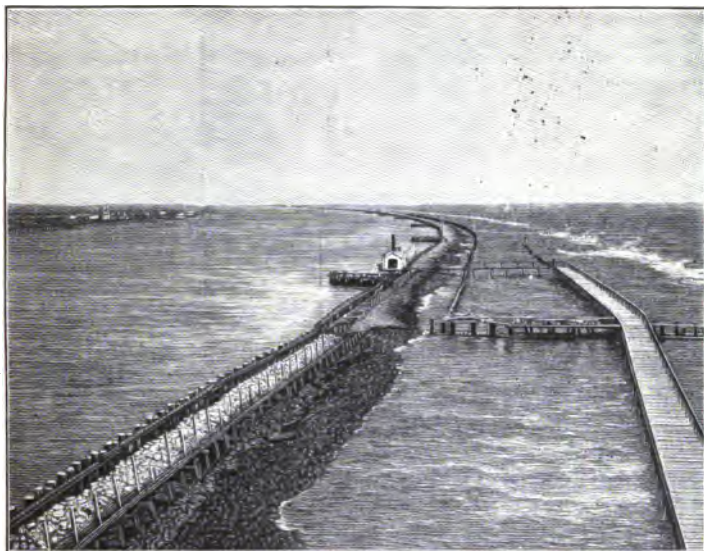


FIG. 20. — Jetties at the Mouth of the Mississippi River.

than in the United States, with the result that their canals and canalized rivers are among their most valuable transportation systems. Many important rivers and river systems are connected by canals, as, for example, the rivers of Russia, and the Rhone, Rhine, and Danube river systems.

Canals are chiefly used in the transportation of bulky articles of a non-perishable nature, such as coal, lumber, etc.

Another class of canals of great commercial and strategic importance are the great ship canals connecting adjacent oceans and arms of the sea, or other large bodies of water, across narrow

necks of land. In most instances the construction of these has considerably shortened the ocean routes between distant parts of the world.

Where canals are employed a dead level is necessary, natural gradients being overcome by means of locks. Sometimes the boats are pulled up an inclined plane by steam power, or lifted by means of hydraulic lifts. Canals are, therefore, most frequently employed in regions where the general surface of the country is level, though they may be established in mountainous districts.

Examples of Inland Canals. — There are some thirty-eight inland canals in the United States, with an aggregate length of 2470 miles, constructed at a cost of over \$200,000,000. The most important of these canals are: The *Erie Canal* from Buffalo to the Hudson River, opposite Troy, 387 miles; *Ohio Canal* from Cleveland to Portsmouth, 317 miles; *Miami and Erie Canal* from Cincinnati to Toledo, 274 miles; *Chesapeake and Ohio Canal* from Cumberland to Washington, 184 miles; *Lehigh Coal and Navigation Company's Canal* from Coalsport to Easton, 108 miles; *Morris Canal* from Easton to Jersey City, 103 miles; *Illinois and Michigan Canal*, from Chicago to La Salle, 96 miles; and *Champlain Canal* from Whitehall to Watervliet, Troy, 81 miles.

Examples of Ship Canals. — (1) *Suez*, between Port Said, on the Mediterranean Sea, and Suez, on the Red Sea, is 31 feet deep, 420 feet wide at the surface, and about 90 miles in length, without locks. It affords an excellent example of the great influence that ship canals may exert, not only on the commerce of the world, but also on the industries of large portions of its inhabitants. Before its construction, the great distance around Africa, between Europe and India and China, not only prevented many articles from being carried on account of the cost, but even rendered it impossible to trade satisfactorily in certain articles which were injured by long exposure to tropical heat. The opening of the Suez Canal has obviated this difficulty.

(2) *The Manchester Ship Canal* connects Manchester with Liverpool and the Atlantic Ocean. It has a length of 35½ miles, with four locks. The least depth of water is 26 feet, and the time required for passing through it varies from five to eight hours. Its great value is that it obviates a break of bulk at Liverpool of the imports of raw cotton to supply the factories of Manchester and the exports of cotton cloth produced by them.

(3) *The Kaiser Wilhelm Canal* connects the Baltic and the North seas through Germany, thus obviating the long water route around Denmark. This canal is 61 miles in length, its terminus at the Baltic Sea being situated at the harbor of Kiel. The depth of water in the canal is 29½ feet.



FIG. 21.—Port Said, Egypt.

(4) *The Welland Canal* connects Lake Ontario and Lake Erie on the Canadian side, and avoids the Falls of Niagara. It is 27 miles in length, 14 feet deep, and has 25 locks.

(5) *The Sault Ste. Marie Canals* are adjacent to the falls of the St. Mary River, which connects Lake Superior and Lake Huron. One canal, belonging to the United States, is a little over a mile in length, and has a depth of water of 22 feet. The other canal is in Canadian territory, and is $1\frac{1}{4}$ miles in length, and is 20 feet deep.

The tonnage passing through the St. Mary canals annually, although traffic is closed during the four winter months, is nearly twice as great as that passing through the Suez Canal in a twelvemonth. Its value, however, is much less. The traffic through the United States canal is much greater than that through the Canadian canal.

(6) *The Panama Canal* will connect the waters of the Pacific with the Atlantic, and will work marked changes in the commerce of the world. It will bring ports on the Atlantic coast of North America nearer to Australia and Japan than any port in the northern part of Europe, and will enable New York, Boston, and Philadelphia to compete on even terms with Liverpool, London, and Hamburg in commercial operations with the coasts of China between Hongkong and Tientsin.

When completed the canal (from Panama to Colon) will have a length of 49 miles, a bottom width of 200 feet or over, and a depth of about 45 feet. The cost is estimated at \$180,000,000 and the time to construct it at 9 years.

Harbors. — Safe and commodious harbors, where vessels can secure shelter from a storm, and load or unload, are very necessary. Harbors are either *natural* or *artificial*, and may be formed wholly or in part by *breakwaters*, *piers*, or *moles*.

Nearly all large cities on the coast have grown in the neighborhood of good harbors, and, in most instances, their original location and subsequent growth have been in large measure due to the advantages so offered. Many of the busiest harbors of the world, such, for example, as those of Liverpool, Hamburg, Bremen, and Marseilles, have been artificially deepened to 25 to 35 feet to accommodate the great modern steamships. Harbors tend naturally to silt up and become shallower, and it requires the expenditure of enormous sums of money, not only for their first construction, but also for their subsequent maintenance.

Types of Natural Harbors. — Sometimes the features of a coast offer unusual facilities for natural harbors. Some of these natural types of harbors are as follows: —

Fiord Harbors. — The long, deep sea valleys that characterize fiord coasts offer great advantages for natural harbors. Many excellent harbors of this character are found on the coasts of Maine and Norway. Trondhjem, on the coast of Norway, is an example.

Harbors in Drowned Valleys. — Where a valley has been submerged by the gradual subsidence of the land, excellent facilities for artificial harbors are often afforded. One of the best instances of this type of harbor is seen in the Golden Gate, which gives the City of San Francisco one of the largest harbors in the world. New York and Delaware bays are other instances of drowned valley harbors.

River Harbors. — The mouths of large rivers often form excellent harbors, especially where such rivers are navigable by large vessels for some distance beyond their mouths. Examples of such harbors are found in Philadelphia, Calcutta, and New Orleans.

Atoll Harbors. — Sometimes during the formation of a coral island the encircling coral reef incloses a large body of water that is capable of affording shelter for the largest vessels. The numerous breaks in the atoll or encircling reef form entrances to such harbor. An excellent example of an atoll harbor is found in the Ralik Islands, in the Pacific Ocean.

Crater Harbors. — In volcanic islands, where the volcanoes become extinct, a break occurring in the side of the crater may permit the entrance of the

sea, and thus provide a harbor. There are two good crater harbors in the Island of New Zealand, near the port of Christchurch.

Island Harbors. — Where no better harbors are to be had, islands may afford sufficient protection to vessels. Harbors of this type are found at Boston and Callao, Peru.

Artificial Harbors. — Where nature offers no proper facilities for harbors, some governments, perhaps at an enormous expenditure of money, have produced them artificially. Among many examples of such harbors is that at Algiers, where the French government, by the building of long breakwaters, has inclosed a large area of deep water, which affords good protection for vessels.

Pipe Lines and Ways. — Pipe lines consisting of great lengths of fluid-tight pipes, through which different commodities are forced by means of pressure, are very generally employed for the transportation of water, oil, or gas.

Mail Facilities. — In addition to the routes above mentioned, there are *mail facilities*, *telephone* and *telegraph* lines, and *submarine cables* to transmit information promptly and with certainty.

The various governments of the world have made arrangements with railroads, steamship lines, etc., to forward mail matter with the least delay possible. By the aid of these facilities, communication can be had by mail with all parts of the civilized world, and at merely nominal charges.

Registered Mail. — In order that letters or packages containing valuable matter may be readily traced, if lost, arrangements are made by most governments for registering them. In the United States this registration only insures that greater care shall be taken of the matter so registered. In many other countries, however, the governments pay for the registered articles that have been lost. Consequently, in the United States, packages of bonds, certificates of stock, or other papers possessing great value are forwarded by express companies, who enter into an agreement, under certain specified circumstances, to repay the sender in case of loss.

Postal Unions. — During the last thirty years, a number of international postal congresses have been held, which have resulted in the establishment of postal unions, with uniform

rates for postage between the contracting countries. Between the United States and Canada, and the United States and Mexico, postal rates lower than the regular union rates prevail.

Foreign Mails. — Various international railway systems and trans-oceanic steamship lines are employed for carrying the



FIG. 22. — Post Office, New York City.

foreign mails. These services are paid for by the governments that are served, and settlements at regular intervals are afterward made among the countries in the postal union.

Sir Rowland Hill inaugurated the system of penny postage in England, and Benjamin Franklin founded the postal system of the United States. Elihu Burritt inaugurated the movement that resulted in cheap ocean postage.

Telegraph Facilities. — Systems of telegraphic and telephonic communication are necessary in commercial transactions—in the purchasing and selling of goods, giving directions for their transportation, shipment, etc.

Telegraph lines almost invariably accompany railroads, both for use in the operation of the road and for the business of

the general public. Besides these telegraphic lines there are numerous additional lines established for general business purposes. In some cases private lines extend between important cities for the sole use of firms of bankers and brokers, or for manufacturing or business houses. Telephone lines have now been established all over the United States and parts of Canada, over the continent of Europe, and in many parts of South America, Asia, Africa, and Australia.

Submarine Ocean Cables. — Submarine or ocean cables are now very generally used by the public, the press, and the different governments of the world. Most of these cables are laid in the North Atlantic (see Fig. 18, p. 64). The North Atlantic is crossed by about fifteen cables. Submarine cables extend also from the United States to the West Indies, and from thence down the eastern coast of South America to Buenos Aires. On the western coast of America they extend from Mexico to Valparaiso. From Pernambuco they cross to Africa, and to Spain and Portugal, and thence to England. Cables are laid also in the Mediterranean, and from Egypt connection is made by land and sea with India, China, the Philippines, Australia, and New Zealand. Africa is surrounded by cables.

A cable has been laid across the Pacific from San Francisco to Honolulu, thence to Midway Island, Guam, and Manila. The Philippine Islands are connected with one another by a very complete cable system owned by the Insular government. Another Pacific cable extends from British Columbia via Fanning Island, Fiji Islands, and Norfolk Island, where connection is made with both Australia and New Zealand. There is also a cable connecting the main body of the United States with Alaska. Consequently, like Puck, we have "put a girdle round about the earth," since there is scarcely any part of the civilized world that can not be reached by wire.

In many of the European countries the governments own and control the telegraphs. In this country the lines are either owned by private companies, or by the railroads.

Wireless Telegraphy. — In addition to the land telegraph and

ocean cables, systems of wireless telegraphy are now in successful operation in various parts of the world.

In the systems of wireless telegraphy there are no wires connecting the sending and the receiving stations, the universal ether that fills all space being employed for the transmission of what are called *electro-magnetic waves*, which are started at any transmitting station by electric sparks or discharges between polished metallic balls. At the receiving station these waves decrease the resistance of an instrument called the *coherer*, consisting of a glass tube, in which the ends of conducting wires are sealed; but these wires, instead of passing completely through the tube, are separated by a short space that is partly filled with metallic filings. Ordinarily, the electric resistance of the filings is too great to permit a battery to send an electric current through them, but when the electro-magnetic waves reach the filings they will, under certain circumstances, so reduce this resistance that an electric current can pass, so that signals sent from the sending station can be transmitted intelligibly to the receiving station.

CHAPTER VII

FINANCIAL CONDITIONS

Meaning of Finances. — By finances, in general, are meant incomes or revenues, as well as expenditures. No business can be carried on without continual expenditures, and, in order to maintain such expenditures, constant revenues are necessary.

Money is any commodity that is generally acceptable in exchange for other commodities, or as a standard of value.

The chief characteristic of money is that it shall possess value either in itself, or in what it represents. The value that money possesses may be either an *intrinsic* value, *i.e.* a dollar in whatever shape it may be, possesses the value of a dollar; or its value may be dependent on the *credit* of a state, individual, bank, or corporation, in whose name it is issued. Money of the first class consists of gold and silver coins. These metals make good money because their value does not fluctuate rapidly and they are durable, easily transported, and easily divided. That of the second class comprises minor coins, and paper money, which consists of bank notes and various other promises to pay.

In civilized countries a certain proportion of the money possesses intrinsic value. In order to prevent fraud, and to facilitate commercial transactions, the different governments have mints from which stamped coins of various denominations are issued, whose weight and value are thus certified.

In order to determine the *exchange value* of the gold and silver coinage employed in different civilized countries, the following methods are employed: Where a single gold standard is used, the value of gold coin in the United States is estimated as equivalent to \$20.67 for every 480 grains of pure gold they contain. In countries where a single silver standard is employed, the value is calculated from the average market value of the pure metal they contain.¹

¹ For values of foreign coins in United States money, see Table IV, p. 414.

Legal Tender. — Legal tender is any kind of money that a creditor is by law obliged to accept in satisfaction of a debt. In the United States gold coins and silver dollars (whose value in gold is arbitrarily fixed and guaranteed by the government) are legal tenders in any amount, as are also government notes (greenbacks and Treasury notes). Where a government employs both gold and silver, but ordains that all contracts and promises to pay shall be understood to mean payment in one of these metals only, while the other metal is left to circulate at such rates as it is worth in the market, it is generally said to have established a *single legal tender*. If, however, the government declares that payments may be made in either gold or silver, at their market values, then that government has established a *double legal tender*. A law so founded of course only affects a nation whose government has established such ordinance. The governments of most of the leading nations of the world have ordained that all large contracts shall be paid in one kind of coin, and that coins of other metals shall be received only for debts not exceeding certain small amounts.

Standards of Money in Different Nations. — The single gold standard is in force in the United States, in Great Britain and her colonies, and in nearly every other country of Europe, as well as in Argentina, Ecuador, and Brazil in South America. Silver is the standard in China, Central America, and in South American countries not already mentioned.

Paper Money. — Paper money, and not coin, forms the bulk of all the money used in commercial transactions. It takes the forms either of *government notes*, or of *bank notes*. These have no intrinsic value, their value being derived entirely from the credit of the government or bank issuing the paper. As long as this remains unquestioned, the paper money passes at its face value. If, on the contrary, there arise any doubts concerning this credit, such money, if current at all, passes only at a rate less than its face value. Therefore, the circulation of paper money is confined chiefly to the country in which the notes are issued.

Nearly all commercial transactions, however, are carried on by means of the use of such substitutes for money as *checks*, *bank drafts*, and *bills of exchange*.

Banks. — Banks are business houses that receive money on deposit, loan money, and discount notes, drafts, and bills of exchange. The Bank of England is the financial agent of the English government. It issues notes like the paper money of the United States, the smallest of these having the value of £5, or approximately \$25. It pays the interest on the public debt, and charges such payment to the government account.

United States National Banks. — There are numerous national banks in the United States, which issue paper money, or national bank notes. The payment of the latter is guaranteed by the United States, such payment being secured by deposits of United States bonds in the Federal Treasury. The national banks of the United States are visited by government inspectors, and statements of their financial condition are published at regular intervals throughout the year.

Methods Employed for Payment. — Most payments are made by means of *checks*, which are simply individual orders upon banks in which the maker of the check has money on deposit; others may be made by means of bank drafts, which are orders by one bank on another. These checks, when presented, are commonly merely credited to the account of the person presenting them. Both checks and bank drafts are balanced up against one another, and the difference is credited to the proper banks and accounts. For the purpose of making these settlements, the banks of every large city establish what is called a *clearing house*, where, at a certain time of each day, the checks and drafts presented to all the banks are brought together, balances are struck, and settlements are made.

Bills of Exchange. — Accounts between merchants of different nations are commonly settled by *bills of exchange*. If A in England owes B in America, and C in America owes the same amount to D in England, B in America may sell to C the evidence of his claim, which C will transmit to D in England in

payment, and D in turn may collect from A, thus avoiding two shipments of gold.

In practice, the debtor buys a bill of exchange from a bank and mails it to his creditor. Being in all respects similar to bank drafts, bills of exchange are settled in a similar manner, by striking balances between the evidences of indebtedness among the different parties.

Were it not for paper obligations, it would be necessary to transport an enormous amount of money, particularly of gold, over all parts of the world. This transportation, however, is avoided almost entirely by the use of drafts and bills of exchange.

Bonds. — When a government or a corporation wishes to borrow money it may issue *bonds*, or promises to pay at a certain future time with interest. These bonds are subscribed for by those who have money to invest, and when the owner wants money he offers them for sale. The buying and the selling of such bonds are undertaken by men called brokers.

Incorporated Companies. — Many kinds of business requiring large capital are carried on by “incorporated” joint stock companies. Such companies are engaged in manufacturing, in the construction and operation of railroads, steamship lines, telegraph lines, etc. The ownership in incorporated companies is represented by *shares of stock*, each of which is of comparatively small value, so as to be purchasable by men of moderate means. Company profits are divided in the form of *dividends* among the stockholders, in proportion to their stock holdings. The sale of such shares of stock is undertaken mainly by brokers.

Balance of Trade. — The relation of the imports of a country to its exports is known as the *balance of trade*. Whenever the value of the imports of a country is greater than that of its exports, the balance of trade is said to be against that country, since, in that case, the country buys more than it sells.

The balance of trade is strongly against Great Britain, that is, she buys far more than she sells; but the interests and dividends that are annually paid to her, on English money invested in foreign securities, or on commissions, which are paid to her in her capacity of banker and middleman for remote countries,

and the wages she receives as carrier of foreign merchandise, go far to offset her large expenditures.

How Different Governments Raise Necessary Revenues. —

The principal means by which governments raise the revenues necessary to pay their running expenses are by taxes on imports. A few countries also tax exports. Such taxes on foreign commerce are called *tariffs* or *customs duties*. An internal revenue is collected also, which may consist of a tax on spirits, tobacco, land, personal property, incomes, checks, deeds, contracts, and the carrying on of certain kinds of business.

In some countries the taxes on imports or exports are levied simply for the purpose of raising revenue, without regard to their effect on industry, — a *tariff for revenue only*; while in other countries they are levied for the purpose of raising revenue, and for the protection of certain industries, — a *protective tariff*.

Tariff Policies of Different Nations. — Nearly all the countries of the world carry on commerce with one another under a policy of protection more or less complete. The only countries that have tariff for revenue only are Great Britain, Belgium, Netherlands, and perhaps Austria-Hungary. The United States, France, Germany, the Mediterranean countries, the colonies of South Africa, Canada, and Australia, and the nations of South America, are under a protective policy. The republics of South America impose high duties on imports, and, in some cases, on exports also.

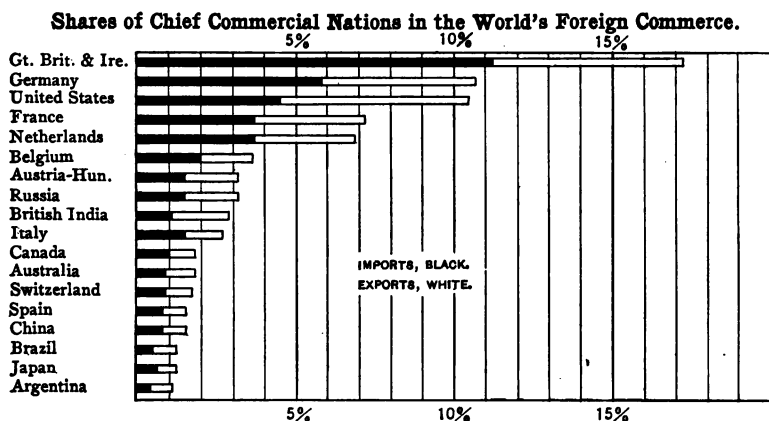
Some countries under a protective policy pay a *bounty* or premium on the production of certain commodities, or on the exportation of certain home products.

Consuls. — In order to protect and promote their commercial interests in foreign countries, the different governments appoint officers called *consuls*, to reside in foreign countries. These consuls report to their respective governments the conditions of commerce in the country where they are residing, and these reports are published and distributed among the people interested in such matters.

Other Government Expenditures for Promoting Commerce. —

In addition to the expenditures required for the maintenance of consuls at foreign ports, many governments expend considerable sums of money in preparing accurate maps and charts of their coasts and harbors, for the maintenance of various *lighthouses* along their coasts and navigable waters, or for the establishment of *life-saving stations*.

Commercial Treaties. — In some cases commercial treaties are entered into between two or more governments, in which



it is agreed that certain customs or duties shall be temporarily set aside for a given period. Such duties are seldom imposed on exports.

In order that none of the governments who form the contracting parties in a commercial treaty shall obtain greater privileges than the remaining parties, a clause in the treaty, called the "*most favored nation clause*," agrees that each party thereto shall enjoy whatever additional privileges may be granted to any other.

Principal Commercial Nations. — Even the leading countries of the world necessarily differ greatly in the amount of their foreign commerce. In Fig. 23 are shown the principal commercial countries and the approximate percentage of the world's foreign commerce handled by each.

Systems of Weights and Measures. — The systems of weights and measures employed in different countries are not uniform (see Table V, p. 415), although in commercial transactions such uniformity is very desirable. In order to secure this, many countries have abandoned the systems formerly employed and have adopted in their place the simpler *metric system*.

The metric system is based on the *meter* as a unit of length, and on the gram, the weight of one cubic centimeter of pure water, at the temperature of its greatest density (4° C. or 39.2° F.), as the unit of weight. The various measures of length, surface, and volume are based on decimal multiples of the meter.

Differences of Time in Various Parts of the World. — Since the earth rotates eastward through 360° in every twenty-four hours, or through 15° in one hour, any place situated 15° east of another will have sunrise one hour earlier. Thus the phenomenon of sunrise passes westward at the rate of 15° in each hour. In traveling completely around the earth, or through 360° , from west to east, twenty-four hours, or one day, appears to be gained. In traveling around the earth from east to west, one day appears to be lost. This difference of time is adjusted at a line called the *International Date Line* extending from north to south through the Pacific Ocean, and coinciding generally with the 180th meridian. The day, or date, may be said to begin at this line. In sailing *westward*, one day must be *added* when this line is crossed; that is, if it is Sunday east of the line, it will be Monday west of it. In sailing *eastward*, one day must be *subtracted*; if it is Monday west of the line, it will be Sunday east of it. (See Fig. 18, p. 64.)

II. COMMERCIAL PRODUCTS

CHAPTER VIII

SOIL AND ITS CULTIVATION

Soils.— Soils, which consist of more or less finely divided mineral matter, are derived from the destruction of rock masses. The processes involved in rock destruction and soil formation are so complex that it is impossible to discuss them in detail in this place. In general it may be said that the causes are both mechanical and chemical, and that the forces work from the surface downwards. Prominent among the chemical causes of rock degeneration is the solvent action of water, especially when combined with certain acids. Among the more important mechanical causes may be mentioned the following :—

The water that sinks into porous rocks, or runs into the crevices or cracks between impervious rocks, on freezing, expands and breaks the rocks into fragments. This action, together with the differences of temperature to which the broken rocks are exposed during the day and night, or summer and winter, causing alternate expansion and contraction, breaks up these fragments into still smaller particles. Again, by the action of running water, the minute mineral fragments carried by the water *erode*, or wear away, the rock masses over which the water flows. This process adds greatly to the amount of mineral waste. Again, moving ice masses or *glaciers*, with their imbedded rocks and pebbles, grind or plane off the surfaces of the hardest rocks, while the abrading action of wind-driven sand does the same thing to exposed rock surfaces. In all these

ways, as well as in other ways, rock masses are ground into the finely divided particles of which soils are chiefly composed.

In addition to the mineral matter thus derived, most soils contain a variable quantity of *vegetable mold*, or *humus*, derived from the decay of plants.

Transportation of Soils. — Soils may be divided into two general classes, viz. : —

(1) *Local soils*, which have been formed in the places where they are found by the decay of the local rock masses.

(2) *Transported soils*, which have been carried considerable distances from the places in which they were formed.

Some of the processes active in the formation of soils are also active in their transportation. This is true especially of running water, glaciers, and the wind. Gravity also is effective, as upon the steeper mountain slopes when fragments are detached and, under its influence, roll toward the base, there forming the characteristic talus. It also promotes the creep of soils on the less steep slopes.

Wherever running water, containing fine rock waste, has an opportunity for depositing it as sediment on the land, it produces an area of great fertility. Such places are found especially in the *flood plains* or "*bottom lands*" along the sides, as well as in *deltas* or deposits at the mouths of rivers. Similar rich deposits of sediment may be accumulated in *lake bottoms*, derived from the sediment of the streams that empty into such lakes. These lakes, subsequently discharging their waters, either through the corrosion of their outlets or through the melting of an empounding glacier, leave large areas covered with an exceedingly fertile soil, suitable for most agricultural purposes. In shallow lakes swamp plants may accumulate, until the lake is changed into a *swamp*. Occasionally such swamps are gradually converted into dry land, suitable for plant growth.

Classification of Soils according to their Origin. — Transported soils may be divided into three classes, viz. : —

(1) *Alluvial soils*, or those transported by the action of water ;

(2) *Æolian soils*, or those transported by the winds ; and

(3) *Glacial soils*, or those transported by the movement of glaciers.

The soils of deltas, bottom lands, and drained lake basins are alluvial. Much of the adobe soil of the western highlands, and the deep, rich *loess* soil of the Mississippi bluffs, and the prairie regions, are believed to be largely alluvial; while the equally rich loess of China and other regions, as well as the poor sandy soils of southwest France and part of the great West, are probably æolian. Most of the soil in the northeastern and northern parts of the United States and in northern Europe belong to the glacial drift.

Classification of Soils according to their Ingredients.— Soils may be classified also, according to their ingredients, as follows:—

(1) *Gravelly soils* contain an abundance of small pebbles. Such soils, if not too coarse, may be very fertile, the finer portions furnishing the plant food, while the coarser particles insure good drainage.

(2) *Sandy soils*, when coarse or composed mainly of quartz fragments, are generally barren. When fine, however, and composed of some kinds of rocks, they may be very fertile. Such soils containing "greensand" and lime sand are frequently fertile.

(3) *Clayey soils* are composed of mineral matter so finely divided as to be almost like flour. These soils are characterized by extreme firmness of texture and great power of retaining water.

(4) *Loamy soils* consist of mixtures, in various proportions, of sand and clay. Such soils are often of great fertility.

(5) *Calcareous* or *limey soils* contain large portions of limestone mixed with sand and clay.

(6) *Marls* are mixtures of clayey material and of finely divided limestone in nearly equal proportions. This name is frequently, but erroneously, applied to the greensands of the southeastern United States.

Peat and *swamp muck* result from vegetable matter decaying under water.

Vegetable mold, or *humus*, is the result of the continued decay of vegetable matter taking place in the air.

Classification of Soils according to their Physical Properties.— Soils are said to be:—

(1) *Light* or *heavy*, according to the ease with which they are worked.

(2) *Cold* or *warm*, in proportion to the amount of moisture that they contain. A soil that contains much moisture changes less in temperature than one that is dry. To a certain extent, therefore, the presence of water lowers the temperature of a soil, and draining a soil tends to warm it. It is important to bear this in mind, since the germination of seeds and other processes of plant growth vary somewhat with the temperature, and are usually more rapid at moderately high than at low temperatures.

The ability of a soil to retain moisture is, therefore, of great importance in determining its agricultural value. Some soils take in water readily, others do not. Some soils, notably the clays, retain the water, while others, such as sand and gravel, part with it quickly. If, however, a gravelly or a sandy soil rests on a clayey soil, water will not so readily escape from it.

Soil Cover. — The soil *cover*, whatever its nature, is also of great importance. It generally consists of snow, fallen leaves, or living plants. The cover tends to limit the quantity of heat the soil receives, but it also hinders its rapid loss of heat. In other words, a soil cover prevents extremes of temperature. The *color* of soil even has an effect on its temperature, since dark colors absorb heat more rapidly than light colors. In some parts of Germany the farmers sprinkle the ground with powdered charcoal to ripen the watermelon crop.

Tillage is the preparation of the land for seed and the keeping of the ground in a fit condition for the growth of crops. This is done in order to prepare a bed for the plant, to enable air and water to reach its roots, to prevent too rapid evaporation, and to expose the soil to the action of the weathering agents. Tillage of the land is effected mainly by the use of the plow. *Harrowing* levels the plowed surface, pulverizes the clods, and leaves a blanket of dry earth to preserve the moisture below. *Rolling* breaks up the clods, levels the surface, and covers the seeds.

Food of Plants. — Plants, with the exception of fungi and certain parasites among the higher plants, get the greater part of their food material from the carbon dioxide of the air, which they take in through their leaves, and from the water, which they take in mainly through their roots. In the tissues of the leaves, under the influence of sunshine and chlorophyll, the carbon dioxide and water are converted into starch, and the surplus oxygen is thrown off.

A small, but very necessary part of the food of plants, however, comes from various mineral matters in the soil, such as potash, lime, magnesia, iron, phosphorus, sulphur, chlorine, and some nitrogen compound, such as ammonia or some nitrate. These elements of the plant's food, when dissolved in water, are taken up by the plants through their roots. The continual raising of the same crop for a long time, in the same field, tends to exhaust the soil of its mineral matters, and thus render it unproductive.

How Exhaustion of Soil may be Retarded or Remedied. — There are various means by which this exhaustion of the soil may be either retarded or prevented.

(1) *By rotation of crops.* Since different crops require different proportions of mineral matter for their food, and obtain this from different depths, by planting the same field with different crops through successive years, the exhaustion of the soil may be retarded or prevented.

(2) *By fallowing;* that is, after a certain rotation of crops to permit the field to rest, or to lie fallow for a period. During this time, by certain chemical changes which are always taking place in the constitution of the soil, a new supply of the elements required for the growth of plants is accumulated in a form capable of ready assimilation by the plant.

(3) *By the use of fertilizers.* Fertilizers are material rich in one or more of the elements of plant food. They are spread over the surface of the soil to renew or to increase its fertility. *Barnyard manure* is widely employed as a fertilizer, since it is rich in ammonia. Commercial or artificial fertilizers, as they are sometimes called in order to distinguish them from barn-

yard manure, are generally much more concentrated, and hence more readily transported than manure. Among such *fertilizers* may be mentioned lime, marl, various phosphate rocks; guano or concentrated bird manure, found in great quantities on some dry islands off the Peruvian coast of South America; bone ash from the cattle pens of South America; gypsum, seaweed, cotton-seed refuse, slaughterhouse refuse, and fish.

(4) *Clover and other plants* of the pulse family have on their roots nodules containing bacteria which gather nitrogen from the air and convert it into a proteid substance, and when the roots decay this nitrogen is left in the soil. These bacteria are now grown in pure form and supplied to the farmers, who treat their seed with them, thus insuring a large crop of clover and also a rich supply of nitrogen for the soil. This is a better and cheaper method of returning nitrogen to the soil than by the use of ordinary fertilizers.

Land Tenure. — In the United States land has never possessed any but a mere commercial value, that is, it has little or no social value, but is regarded merely as capital, from which an income may be derived. Two thirds of the farms in the United States are owned by the farmers. The remaining third, which are mainly in the South, are worked for a share of the products.

In Europe, until about a generation ago, the lands were owned mainly by the nobility, and worked by the peasantry on various terms. The occupants of the farms were, in greater or less degree, subject to the owners of the soil. In recent years this has happily changed to a great extent, the soil being mainly the property of the peasantry. But in only two countries of Europe, viz., Germany and Sweden, is the land as completely in the hands of the farmers as in the United States. In France, Norway, Belgium, Netherlands, and Portugal about half of the farmers own their land; while in Austria-Hungary, Italy, Spain, Denmark, and Great Britain less than half the farmers own their land. In Russia a large part of the cultivated land is held collectively by the inhabitants of a village, who assign it at stated periods to individual farmers. In Canada, Argentina, and Australia nearly all the farms are worked by their owners; while in India the land is held mainly by the government, and is rented to the farmers.

The ownership of the land tends to create a spirit of independence and of responsibility, and should be encouraged by every intelligent government as conducive to good citizenship.

CHAPTER IX

VEGETABLE PRODUCTS

GRAIN CROPS

The Cereals, or grains, include several members of the grass family and are cultivated for their seeds, which are used as foods. The most important of the cereals are wheat, corn or maize, buckwheat, barley, rye, oats, millet, and rice.

only **Wheat** is the most important of the cereals. Although a greater number of the human family live on rice than on wheat, yet wheat contains, in a given bulk, a much larger proportion of the elements required for the food of man. Moreover, it contains these elements in a form more condensed than they are to be found in almost any other food. Consequently, the consumption of wheat is constantly increasing in nearly all parts of the world, so that it bids fair to become the principal food staple in the near future.)

During its growth wheat requires less water than any other cereal. But, whatever may be the climate in which it grows, it must be able to get its first growth during the cool and moist part of the year, and come to maturity during the warm, dry season. It possesses, however, remarkable powers of adapting itself to varying conditions of soil and climate. Therefore, as shown in Fig. 24, it is cultivated over exceedingly wide areas.

Principal Wheat-growing Countries. — The black sections of the map in Fig. 24 indicate the wheat-raising regions of the world, and the diagrams indicate the relative importance of the chief wheat-producing and wheat-consuming countries.

Cost of Production. — The conditions existing in the northern, central, and western parts of the United States make it possible

to produce wheat so cheaply that, aided by cheap transportation by the great water routes, railroads, and canals, the wheat raised in this country is able to compete successfully in Europe with wheat raised on the plains of Hungary, or by the cheap labor of India.

why

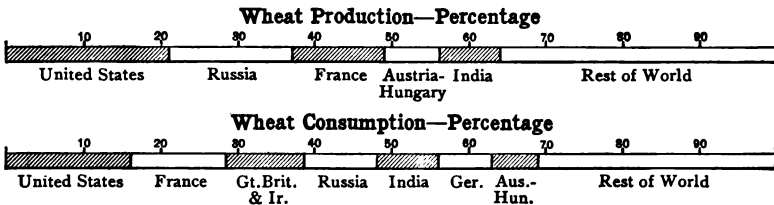


FIG. 24.

- result -

As a rule, in the United States land is both cheap and abundant. Moreover, the soil as yet requires but little fertilizing; and although labor is high, yet it is also intelligent, and, consequently, efficient. Farming is conducted on a large scale, and machinery is generally employed for cultivation; the land is broken by plows driven either by animal or steam power, and the seeding, harvesting, thrashing, and winnowing are effected by machinery that is driven by steam power whenever possible. The United States and Russia raise more wheat than they use, and, consequently, they export large quantities of this cereal to the western parts of Europe, both in the shape of the grain and manufactured into flour. Argentina, and in favorable years India, also export wheat.

Manufacture of Flour. — The wheat seed or berry consists of a starchy mass, about which is a layer rich in nitrogenous

substances, called *gluten*. Outside of this is a silicious, woody husk, which forms the *bran*. The nitrogenous matter is flesh-forming and adds to the flour life-giving qualities which it would otherwise lack. It is this material that causes the dough made from the flour to be tenacious, so that it is readily raised or lightened when mixed with yeast. It is the aim of the miller to produce flour containing as large an amount of gluten as possible, without the admixture of bran.

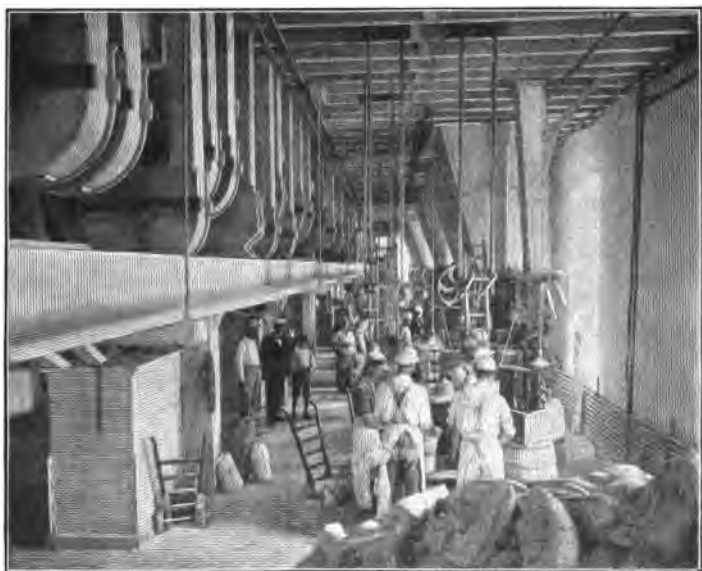


FIG. 25.— Interior of a Large Flour Mill.

The wheat is manufactured into flour by the process of grinding. In olden times this was accomplished by placing the wheat between two millstones, formed of hard sandstone. These stones were placed either near together or far apart, thus producing what is called *high* and *low grinding*, respectively. Low grinding is the old-fashioned method still used in some country mills. It possesses the advantage of producing the greatest amount of flour by a single grinding. By the new process of milling, the wheat is subjected to a series of successive grindings by the use of several steel rollers. In some processes as many as six or seven of these are employed. In the first grinding

the wheat is broken into coarse particles, which are bolted to separate the bran. The middlings are then ground successively to much finer particles.

Manufacture of Bread. — In the manufacture of bread the dough, made by mixing flour with water, is lightened by some natural ferment, such as yeast, or by the use of baking powder. By either of these processes carbonic acid gas is liberated, forming bubbles or vesicles in the dough, rendered tough by the presence of gluten, thus causing the bread to expand and become porous. In *aërated* bread carbonic acid gas is mechanically introduced into the dough.

None of the other cereals, except perhaps rye, contain sufficient gluten to permit them to be thus raised. They may, however, be mixed with sufficient flour to permit this to be done.

Wheat and its Products as Articles of Commerce. — Either in the shape of grain or as flour, wheat constitutes an important article of commerce. Since the modern improvements in railroad and steamship transportation, both the production and consumption of wheat have greatly increased, so that wheat now ranks in importance with cotton and wool as an article of export.

Corn or Maize. — This cereal, generally called corn in the United States and maize in Europe, is cultivated over a wide geographical range. Corn is essentially a warm-weather crop, and thrives best where the summers are hot and the rainfall is fairly abundant. It cannot be cultivated as far north as can wheat; but, on the other hand, can be grown farther to the south, and, under similar conditions, the yield per acre is very nearly double that of wheat.

Principal Corn-producing Countries. — Although Fig. 26 indicates that corn is cultivated in many parts of the world, the diagram shows that by far the larger part of the world's crop is produced in the United States. Mexico and southern Europe produce much of the remainder.

A variety of corn, known as sweet corn, is raised in certain parts of the United States and in Mexico. It is eaten directly as an article of food, or is canned for winter use.

Manufactured Products of Corn. — The principal use of corn is as a food for live stock. Eventually, therefore, the corn is consumed by man in the shape of meat. A small amount is used directly by man as corn meal.

Much corn goes to the *distiller*, who employs it for the manufacture of *whisky* and *alcohol*. It is used also in the manufacture of *starch* and *glucose*.

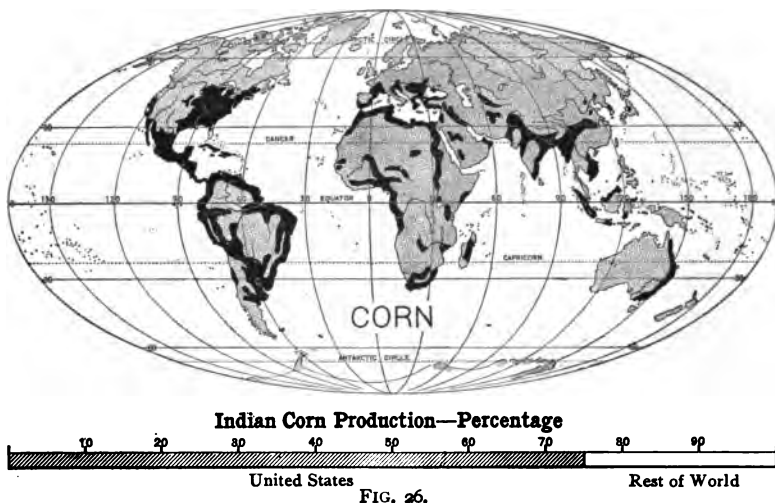


FIG. 26.

The commerce in corn is, as yet, comparatively limited, owing to its great bulk. Except in the years when the European crops of other grains are short, especially those of wheat and rye, the exportation of corn from the United States is not large. As a rule, not more than about 5 per cent of our corn crop is exported.

Buckwheat. — Buckwheat thrives in a poor soil, and comes to maturity so rapidly that, though quite sensitive to frost, it is rarely injured by the approach of winter. Its blossoms contain a large amount of honey, so that, in some parts of the United States, buckwheat is raised as a food crop for the bees. It is cultivated in the United States and Canada, and also in various parts of Europe.

Barley. — Barley is the hardiest of all the cereals, and has the widest range. It is grown as far as 70° N. latitude, in Lapland as well as in equatorial Africa.

In ancient times barley was the chief bread plant of the Hebrews, as well as of the Greeks and Romans. It is still used in eastern Europe as an article of food; but very little of it is used for this purpose in the United States. The chief commer-

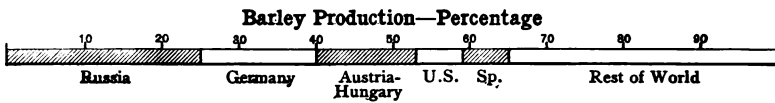
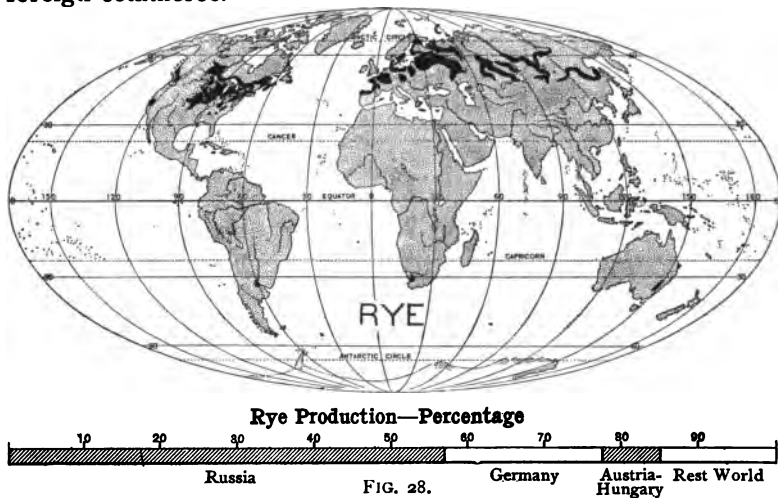


FIG. 27.

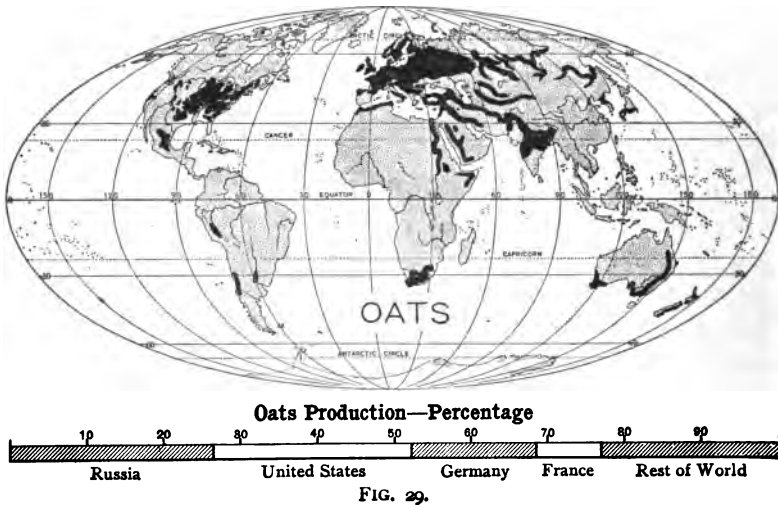
cial importance of barley is in its use in making malt, from which beer is made. About 12 per cent of the world's product of this cereal enters into foreign commerce.

Rye has been employed as a food from very remote ages, and still forms one of the principal foods for at least one third of the people of Europe. It makes the "black bread" of the peasantry. Rye grows in a poor soil, and much was produced in early days in the United States, because it required but little care. It is now of less relative importance among the crops of the country. Figure 28 and the diagram show that three countries of Europe produce the bulk of the world's rye crop. It is used also as a food for animals, and, especially in this country, by

distillers. About 5 per cent of the total production enters into foreign commerce.



Oats. — This is also a hardy cereal, and will grow in a much colder climate than corn or wheat. Until recently it was used in the United States solely as a food for live stock, but of late it



has become a popular breakfast food. Its bulk prevents it from being exported in large quantities, only about 5 per cent of the total crop entering into foreign commerce.

Millet is a name given to several grains that are cultivated mainly in India, where they form a large part of the food of the lower classes. A variety of millet, grown in Africa, is known as "durra," or sometimes as Guinea corn.

Rice is, next to wheat, the most important cereal. It is said to constitute the principal food of more than one third of the

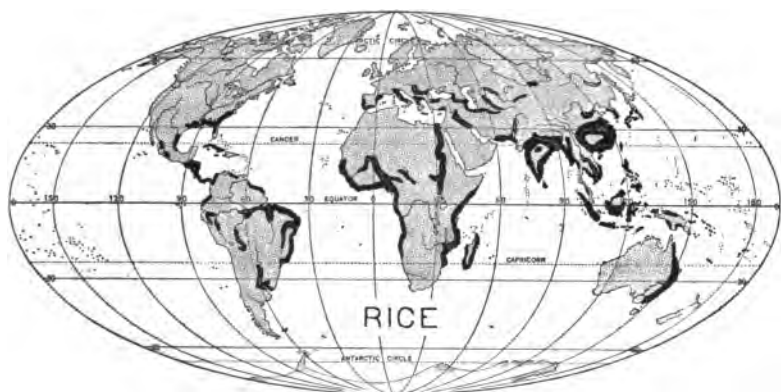


FIG. 30.

human race. It grows best in tropical or subtropical climates, where the conditions are such as to permit the fields to be flooded with water.

Like the other cereals, rice is one of the grasses. It is bearded like wheat, and, when unhusked, closely resembles barley. The best varieties grow between 45° N. and 30° S. latitude. After the field is seeded it is covered with water. As soon as the seed germinates, the water is drawn off the field, which is permitted to become dry, until a few leaves appear, when the field is again flooded with water. These alternate floodings and dryings occur until the grain is well formed.

Unhusked rice is called "paddy." When ripe, the rice is picked, thrashed, and screened, to remove the "trash." It then passes to the milling stone, by which the outer husk is removed; and to blowers, where the chaff is blown

out. The grains are then subjected to a process called "polishing," by means of which the separate grains are polished so as to receive the pearly white appearance so characteristic of rice. The by-products of the rice, viz., the rice bran, rice flour, and rice hulls, are employed as cattle foods.

Principal Rice Countries.—Figure 30 shows the regions in which rice is cultivated. By far the largest proportion, however, is produced in China, India, and farther India, though large crops are raised also in Japan, Java, and the other East Indies.

Some Uses of Rice.—The principal use of rice is as a food. In some parts of the world it is parched, and used to make a beverage like coffee. In Japan a beer, named *saki*, is made from it. In the East it is distilled, and produces a liquor, called *arrack*. The straw is employed for the manufacture of hats, baskets, and matting.

BEVERAGE CROPS

Coffee is the seed or bean of an evergreen shrub that grows in many parts of the tropics. The coffee tree attains a height of from 5 to 15 feet. It bears small white flowers, which are found on the tree for eight months of the year. The tree needs a warm, moist climate, and produces fruit which, when ripe, usually contains two seeds or beans, which constitute the coffee of commerce.

Considerable preparation is needed before the coffee bean is put on the market. In the first place, the pulpy covering must be removed. On large plantations this is done by machinery. Then the seeds are exposed to the sun for a week or ten days, until the sugary matter clinging to the berries is all removed. The beans are then carefully stripped of the skin which still covers them, winnowed to rid them of the hull chaff, and sorted according to quality or size. The quality of the coffee and the price it commands depend largely on the care with which it is prepared for the market.

Principal Coffee-producing Countries.—The map in Fig. 31 shows the regions in which coffee is grown, and the diagrams indicate the relative importance of the chief producing and consuming countries. It will be noticed that Brazil is by far the largest producer, and that the United States is the largest

consumer. Of the different grades of coffee, *rio* comes from Brazil, *mocha* from Arabia, and *java* from the island of the same name.

A comparison of the sources with the places of consumption of this commodity indicates that coffee enters largely into

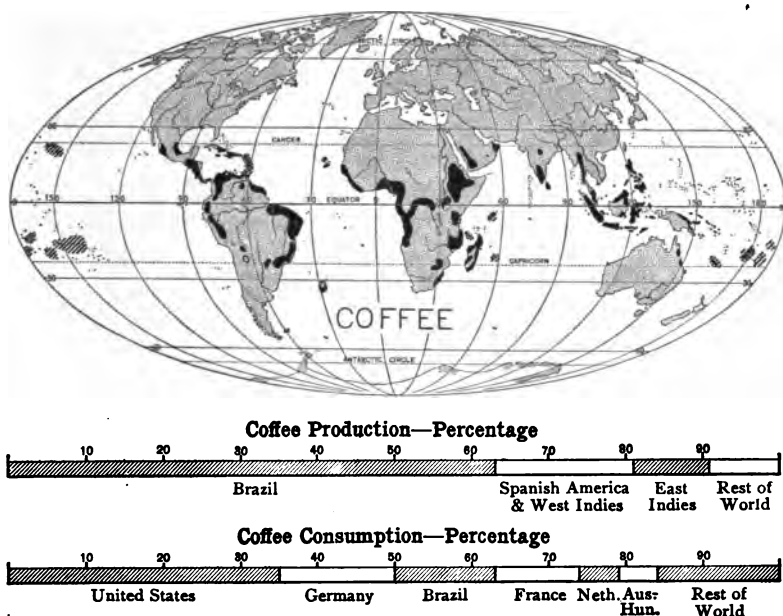


FIG. 31.

foreign commerce. About four fifths of the world's product is exported out of the countries in which it is grown.

Tea consists of the dried leaves of a fragrant shrub of south-eastern Asia, belonging to a botanical family closely allied to the well-known camellia. From the tea leaves is prepared a beverage, the use of which is very general.

Picking and Preparation of Tea Leaves. — The preparation of tea is a matter of the greatest importance as affecting both the quality and the value of the tea. The leaves are picked several times each year. The best quality comes from the undeveloped

bud at the end of the young shoot. This quality is known as *Pekoe*. It seldom reaches this country, being nearly all consumed in the place where the tea is raised. The best quality for export is prepared from the youngest leaves. The poorest grade is made from the twigs and old withered leaves, that are pressed into *tea bricks*, and exported to other parts of Asia.

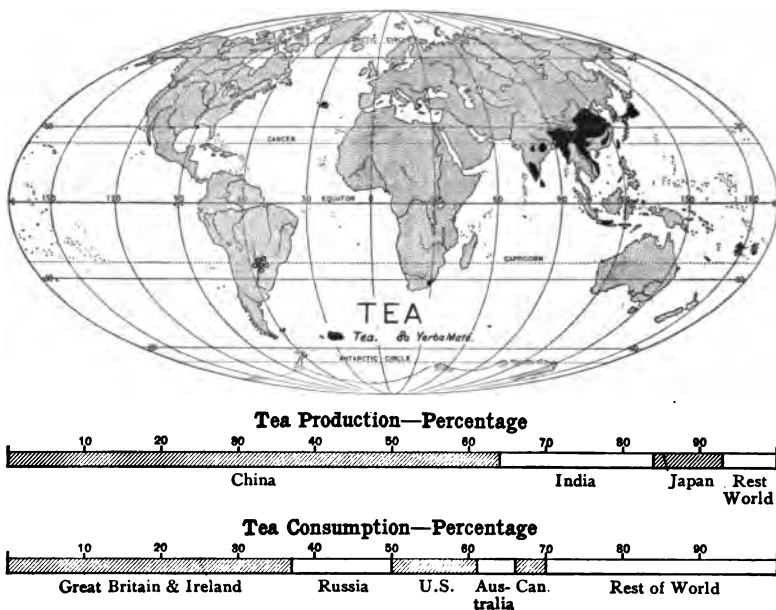


FIG. 32.

The difference between black and green tea is due entirely to the method of curing the leaves. The leaves are picked and dried in the same manner, and are then crushed and heated to permit them to undergo a fermentation. Thus far the processes are the same for both the green and the black teas. If, however, at this step in the operation, the leaves are dried rapidly, and with but little exposure to the air, they will remain green; but if dried slowly, and mainly by the sun's heat, they will turn black. The greater demand for green tea in this country has caused the Chinese to color inferior black teas artificially.

Maté or Paraguay Tea is employed as a substitute for tea. Maté is obtained from the leaves of a shrub that grows wild in the forests of Paraguay and other parts of South America. It forms an important article of commerce between some of the countries of South America.

Cacao or Cocoa.—The cacao bean is obtained from a tree with smooth evergreen leaves that grows in tropical regions, where the soil is rich and the air warm and moist. Ecuador is the principal producer. The tree reaches a height of from 16 to 18 feet, and bears fleshy, five-celled pods, each of which contains 20 to 30 almond-shaped beans. These pods are usually gathered twice each year, but the largest crop is harvested in May and June. The fresh bean is crimson in color, and has a bitter taste.

The beans are prepared as articles of commerce as follows: they are removed from their pods, and sweated by wrapping them in green leaves, placed in a close room, where a slow fermentation takes place. This removes the bitter taste. The beans are then spread on trays, covered with red mud, and left for a day, when they are rubbed through the hands or trodden under the bare feet, so as to remove the gummy matter. They are then turned at intervals, until they are dry, when they are ready for export to the great chocolate and cocoa factories.

Manufacture of Chocolate.—The cacao beans are first deprived of their oily matter, which is run into molds, and sold for *cocoa butter*. The beans are then roasted, crushed, and ground. The powder that is thus produced is known as *cocoa*. When pressed together, generally after it is mixed with other substances, such as sugar, it is called *chocolate*.

Cocoa is employed in considerable quantities as a beverage, either in the form of cocoa or as chocolate. Chocolate possesses considerable value as a food, and great quantities are consumed in tropical America, Spain, Portugal, France, and the United States.

FIBER CROPS

Cotton.—Cotton is a product of the subtropical, tropical, or warm temperate climates. It is but one of a great variety of

plants that have filaments or threads attached to their seeds. Whenever, as in the case of the cotton plant, such filaments occur in bunches, and in a form in which they are readily twisted together into threads, they form the raw materials from which various textile fabrics employed for clothing are manufactured.

The fibers of cotton are peculiarly fit for weaving, since they are ready for spinning without any previous chemical or mechanical preparation. This is owing to the fact that the cotton filaments are spirally curved, so that when twisted they cling together, and form a thread of considerable strength.

The cotton plant, though not really an annual, is so treated in cultivation. There are several varieties of cotton plants. "Sea-island" or "long fiber" cotton is grown on the sandy islands near the southeastern coast of the United States. It is employed mainly for spool cotton and fine muslins. "Upland" cotton is a shorter and more woolly fiber. It is cultivated in the interior of the southern part of the United States. Sea-island cotton forms only about 1 per cent of the cotton grown in the United States.

Figure 33 shows the regions in which cotton is raised, and the relative production and consumption of the chief producing and cotton-manufacturing countries. These diagrams indicate that raw cotton enters largely into foreign commerce, only about one third of the crop being manufactured in the country where it is raised.

Preparation of Cotton. — In the United States cotton is usually planted from about the middle of March to the middle of May, and matures early in the fall. Each plant produces a number of cotton bolls or heads, which vary in size from that of an English walnut to a small apple.

Each cotton boll contains many seeds, about the size of small peas. The cotton fiber was formerly cleansed or freed from the seeds by *hand picking*. The *cotton gin*, however, invented by Eli Whitney, and much improved since his time, pulls the fibers, by means of rollers, through spaces between which the seeds cannot pass. After ginning, the cotton is compressed into bales of about 500 pounds each, in which form it is transported to the cotton factories in various countries.

Manufacture of Cotton Goods.— Cotton was first spun by hand by the use of a *distaff and spindle*. At first these were held in the hands; afterward they were used in connection with a revolving wheel. Hargreaves invented the spinning jenny, by means of which several spindles could be operated simultaneously. A subsequent invention by Arkwright of a machine that could be used in factories made possible a great increase

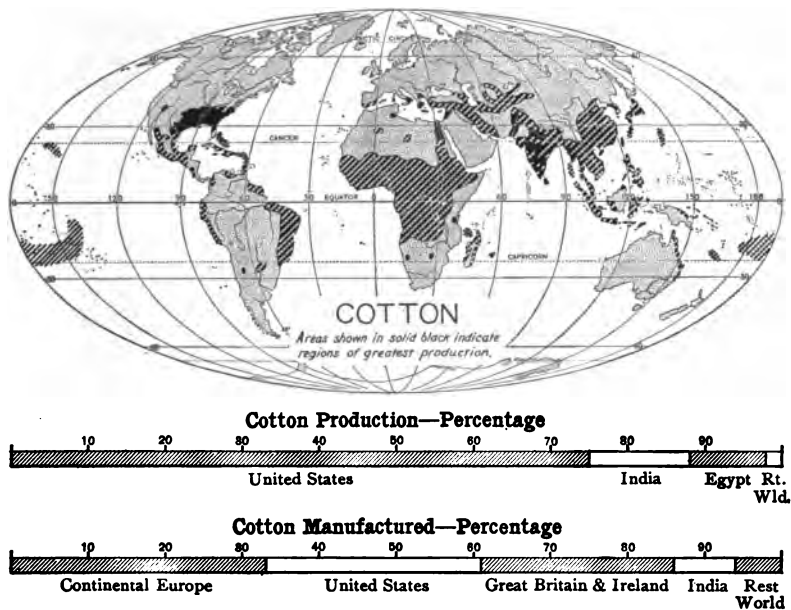


FIG. 33.

in the production of cotton yarn, and this industry, united with that of the weaver, especially after the invention of the power loom, gave birth to the modern factory, in which all the different operations necessary for making cotton cloth, muslin, calico, and cambric are carried on.

By-products.—The seeds separated from the cotton fibers are utilized in various ways. A valuable oil, called *cotton-seed oil*, is extracted from the seeds. The remaining product is pressed together into a mass called *oil cake*, which forms an

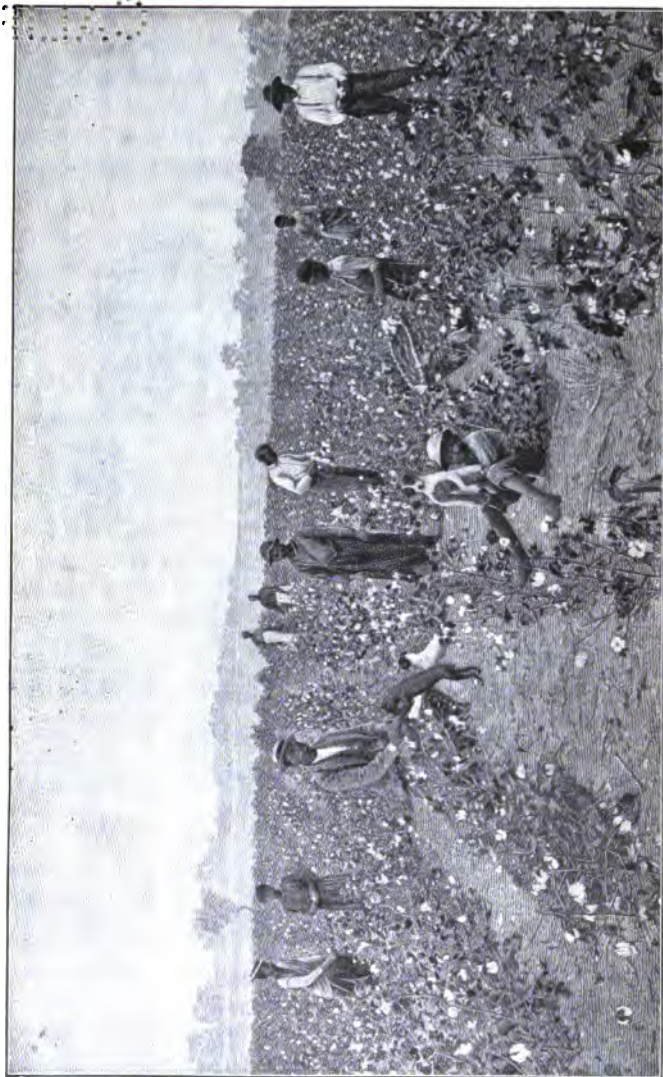


FIG. 34.— Cotton Field, United States.

excellent food for cattle. Cotton-seed oil, when refined, is employed either as a substitute or as an adulterant for olive oil, and in the manufacture of soap. Preparations are also made from cotton-seed oil. These replace lard and butter for cooking.

Flax.—Flax is an annual plant that reaches a height of from 2 to 3 feet. It bears blue flowers, and grows best in an equable temperate climate, and on heavy, well-drained, rich soil. It can be raised, however, in both cold and hot parts of the world.

Flax is cultivated both for its fibers and its seed. Its fibers are obtained from the inner bark and constitute the material of linen cloth.

Preparation of Flax.—After the plants are pulled and the seeds removed they are tied in sheafs and soaked in water for several days, until the glutinous matter surrounding the fibers is softened. The sheafs are then opened and dried in the sun.

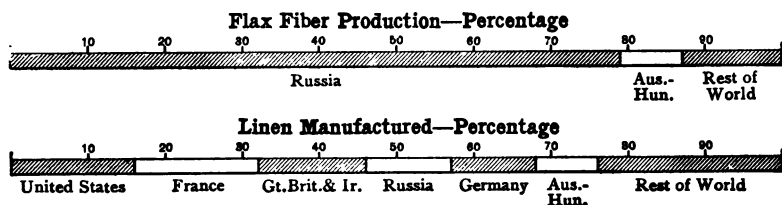


FIG. 35.

The fibers are separated from the stalks by passing the flax between rollers, and the broken parts of the stalk are whipped out in a process called "scutching." The fibers so separated are then drawn through a many-toothed comb, in order to separate the longer and better fibers called "line" from the shorter ones called "tow." The fibers are then formed into a continuous thread by spinning. Originally, flax spinning, as in the case of cotton, was done by hand, but it is now accomplished by means of machinery.

In some parts of the world, especially in India, the United States, and Argentina, flax is cultivated chiefly for the sake of its seed, which forms an article of commerce known as flaxseed

or linseed. It is from these seeds that *linseed oil*, so largely employed in the preparation of paints, is obtained. Flax is grown in large quantities in various parts of the world, but Russia is the great source of the fiber, though the much smaller crops of some other countries, as Ireland, Belgium, and Netherlands, supply fiber of finer quality.

Flax is manufactured into various textile goods. France has long been noted for the manufacture of its *cambrics*, a fine class of linen goods. Belfast, in Ireland, is noted for its *linen* goods. The use of flax as a material from which cloth was woven was known in Egypt many thousand years before the Christian era.

Hemp.—Hemp, like flax, is also an annual. It reaches a height of from 3 to 20 feet, and produces a coarser fiber than flax. Its fiber is prepared by practically the same means. The finer fibers of hemp are employed in the manufacture of sail

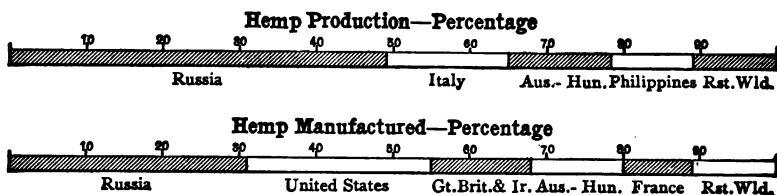


FIG. 36.

cloth and coarse cloth for the peasants of Russia. The coarser varieties are employed in the manufacture of *twine*, *cordage*, *bagging*, and *sacking*. The so-called Manila hemp, or abaca, of the Philippines is the inner bark of a species of banana palm.

Jute and Other Fibers.—Jute is an annual that reaches a height of from 5 to 15 feet. The coarser fibers are employed in the manufacture of *gunny bags* and *cheap carpets*. The finer varieties of jute are often used as an adulterant in the manufacture of fabrics of great beauty.

Among other plants, whose fibers are employed for making clothing or paper, may be mentioned *henequin*, whose fibers are employed in Mexico for bagging; the *ramie* plant or *China grass* employed by the Chinese in the manufacture of a great

variety of goods; and the *bamboo*, whose fibers are extensively employed in China and the East for clothing, mats, bags, etc.

OTHER CROPS

Sugar.—The two principal sources from which the sugar of commerce is obtained are the sugar cane and the sugar beet. In addition to sugar so obtained there are several other kinds,

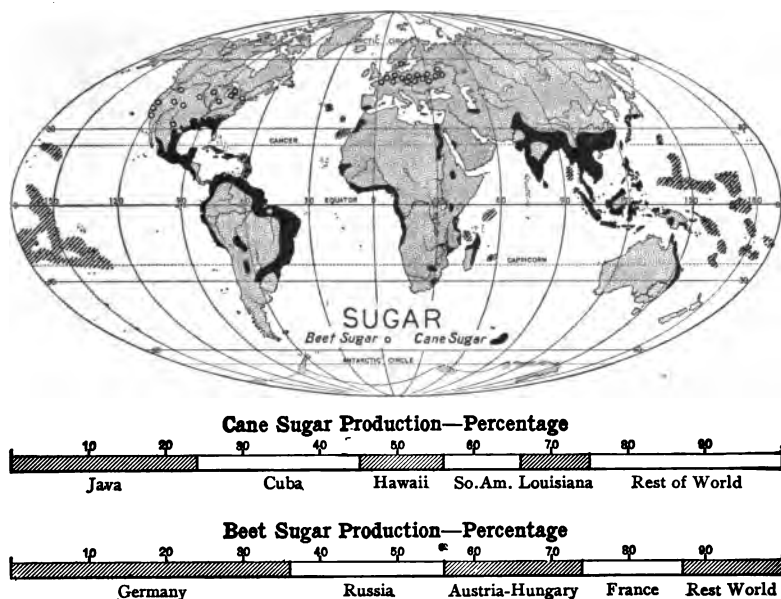


FIG. 37.

such as the *maple sugar*, obtained from the sap of the sugar maple of northeastern United States and Canada, *sorghum sugar*, and various other sugars obtained from different fruits.

Cane sugar is obtained from the juices of a variety of grass, somewhat resembling the Indian corn plant. The spongy tissue of the stalk contains the saccharine juices. Sugar cane requires for its growth a hot climate and a soil rich in phosphates. With the single exception of tobacco, it requires a greater amount of

labor per acre than does any other plant. Consequently, it can never be raised profitably except in localities where labor is cheap.

Sugar cane is raised both in tropical and subtropical countries. Java and Cuba are the principal producers.

Manufacture of Cane Sugar.—The process of manufacture consists in extracting the juice by crushing the sugar cane between heavy rollers. The juice is then carried by pipes to the clarifier, where it is sterilized by heating to 130° F. Unless so sterilized the juice would ferment, and thus be prevented from crystallizing. Lime is added to neutralize the acids present, and the juice is rendered antiseptic by the injection of sulphurous acid gas. It is then boiled down until it reaches the point of crystallization, when it is placed in centrifugal separators, where the crystallized sugar is separated from the drippings, or molasses. This latter material is sometimes employed for the manufacture of rum.

The crystals of sugar obtained from the centrifugal machine are in the crude form of brown sugar. For the use of the table, or the *confectioner*, the sugar must be refined. This is done by dissolving the sugar in water, and passing the solution through various filters, some of which are formed of animal charcoal. The liquor is carefully evaporated in vacuum pans, and crystallizes. From these crystals are produced the white commercial forms known as loaf, crushed, granulated, and powdered sugar.

Beet Sugar.—It was not until about 1825 that factories were established for the production of sugar from beets. Now a greater amount of beet sugar is produced than of cane sugar.

Germany leads the world in the production of beet sugar. This is owing to the fact that the government has placed a protective tariff on cane sugar, and paid bounties on the production of beet sugar.

The beet generally grown for the production of sugar is the white beet. It requires for its growth a rich, loamy soil, and takes less labor to produce than does sugar cane. The amount of sugar in beet juice depends not so much on the size of the beet as it does on the quality of the juice, and this quality can be greatly increased by properly fertilizing the soil. Beet juice contains about 10 per cent of sugar while cane juice contains about 14 per cent.

Manufacture of Beet Sugar.—The beets are first sliced and the chips placed in cast-iron cells and washed with hot water to obtain their saccharine juice. The chips are then pressed to obtain the remaining juice. Since the juice contains, in addition to the sugar, a large quantity of various gums, salts,

and nitrogenous products, it is necessary that the sugar be separated from these substances. Lime is usually added to the juice in order to neutralize the acids present. The subsequent treatment is substantially the same for beet as for cane sugar.



FIG. 38.—Cutting Sugar Cane.

Although the United States consumes a greater amount of sugar than any other nation, but one fourth of the amount used is produced in this country. The annual importation of sugar reaches nearly \$100,000,000 in value. This import is in the shape of crude sugar, which is refined in this country. The next greatest consumer of sugar is Great Britain, nearly all of whose sugar is imported. Germany, Russia, and France, however, produce more sugar than they consume, and therefore have a surplus for export.

Vegetables and Farinaceous Products.—Vegetables are usually either so bulky or so perishable that, up to a comparatively recent date, it has been impossible to ship them any considerable distance. In the neighborhood of all large cities, however, there are *market gardens* or *truck farms*, where vegetables are cultivated.

It is now possible, even in the winter months, to supply the tables of men of moderate means in the cities of northern countries with fresh vegetables and fruits from southern gardens and orchards. This has come about through increased speed in transportation; by the use of cars constructed for the preservation of perishable articles; and the erection of cold storage houses that may be kept at a constant temperature.

Potatoes are raised in enormous quantities in Europe and throughout the United States and Canada. They constitute



FIG. 39.

one of the principal food products of Germany, Russia, and Ireland. In the southern part of the United States the sweet potato is widely cultivated.

Peas, beans, onions, turnips, parsnips, and carrots are mainly consumed near their points of production. They are cultivated generally throughout the United States and Europe, and are used as food both for man and beast.

Canned Vegetables.—Peas, beans, green corn, and various fruits may be preserved by the process of canning. This process consists in placing the articles inside tin cans and heating them so as to drive out all the air. Then they are hermetically sealed or soldered. The operation, when properly performed, excludes various bacteria or microscopic organisms of plant or animal life that cause putrefaction and decay. In this condition, canned goods constitute articles of commerce.

Cassava and tapioca are the granular meal obtained by heating and pressing the tubers of the manioc plant. It forms a staple article of food among the common people of Brazil and other tropical countries, where the plant is largely cultivated.

Sago is obtained from the pith of the sagus palm of the East Indies and the cycas or sago palm of the West Indies. It is

largely used as an article of food in the countries of its growth, and is exported to a limited extent.

Some Manufactured Farinaceous Products. — By various processes of manufacture starches are obtained from the potato or from some of the cereals. Starch obtained from corn is called cornstarch. Macaroni and vermicelli consist largely of the starchy matters obtained from wheat flour.

Hay. — A valuable article produced on most farm lands in temperate latitudes is hay. Its principal use is as food for live stock. Most of the hay in the eastern part of the United States is made by drying *timothy* or *clover*. In the arid and semi-arid regions of the west, where irrigation is practiced, a species of clover called *alfalfa* is raised in great abundance as food for cattle.

Hops are employed mainly in the manufacture of beer, the aromatic principles which they contain being used to give it a peculiar taste, and to check fermentation. Hops are raised largely in northern and central Europe, and in the northern and western parts of the United States.

Tobacco belongs to the order of plants that produce such highly poisonous substances as belladonna, nightshade, and henbane. It is an herbaceous plant, with large oblong leaves, and reaches a height of from 3 to 5 feet. In cultivation the plant requires rich soil, heavy manuring, and about twice as much labor as does an equal area planted with corn. Tobacco constitutes an important article of commerce, and can be cultivated from tropical to temperate regions.

Preparation of Tobacco. — When fully grown the leaves are cut, tied in bundles, and dried by the application of a gentle heat with free access of air. They are then pressed and packed in hogsheads for transportation to the establishments where they are manufactured into *cigars*, *cigarettes*, *smoking tobacco*, or *plug tobacco*.

There are many varieties of tobacco. Those of Cuba and the Philippines are generally considered best for cigars, that of Turkey for cigarettes, and that of Kentucky, North Carolina, and Virginia for pipe smoking and chewing.

The United States exports nearly one half of her entire product, most of which goes to Great Britain, Germany, and France. India also exports a large part of her production. The other producing countries consume nearly all they produce.

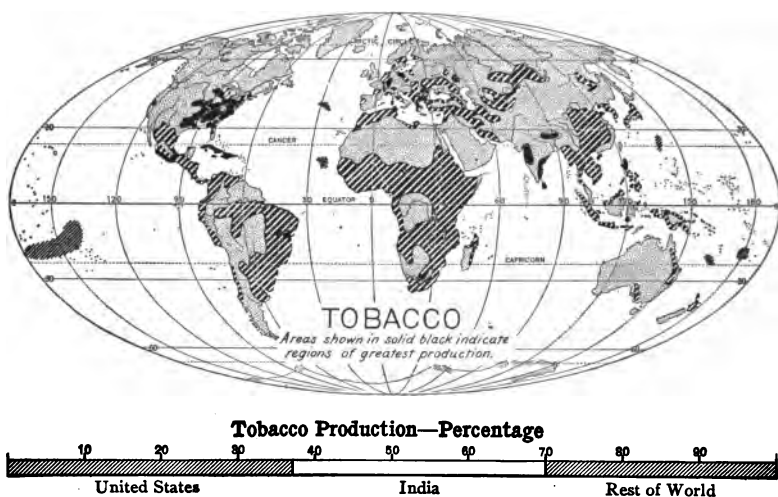


FIG. 40.

Opium is obtained from the seed pod of the poppy, a plant that is cultivated in various parts of the world. India, China, and Asiatic Turkey are the principal producers. The plant is delicate, and requires great care in its cultivation. It is liable to injury by wind, rain, and insects.

Preparation of Opium. — In India the seeds of the poppy plant are sown in November, and the flowers appear in January. About three or four weeks after the appearance of the flowers the seeds or heads are formed. When these are as large as hens' eggs, they are ready for the collection of the opium. The opium collectors wound each seed head early in the afternoon, and a milky juice is exuded which, the next morning, is carefully scraped off into shallow open vessels. All watery fluid is then allowed to run off, and the opium in the dish is exposed to the sun for three or four weeks, and turned daily, until it dries in

the shape of a gum. In this form it is sent to the factory, and there kneaded into balls for export.

China is the principal user of opium. Large quantities are produced in that country, and also in parts of India, where the British government has a monopoly of the trade. Any one in India may raise poppy plants, but all the opium so produced must be sold to the government at fixed rates. The annual gross revenue to the British government from this trade is \$38,000,000.

Opium has a bitter taste and a reddish brown color. Its chief medicinal value is in the morphine and other alkaloids it contains. *Laudanum*, a tincture of opium and alcohol, and *paregoric*, a preparation containing laudanum, are employed in medicine for the relief of pain, allaying irritation of the nervous system, and producing sleep. When used habitually, laudanum produces most injurious effects.

FRUIT PRODUCTS

Fruit Products of the Temperate Zone include the orchard products, vineyard products, berries, and nuts.

Orchard Products.—The chief orchard fruits are apples, peaches, plums, pears, cherries, and apricots. Of these, apples are most widely raised, and are of greatest commercial importance. They are raised in nearly all countries of the temperate zones, and are exported from the United States, Canada, and several European countries. They are used not only as a table fruit in fresh or preserved form, but are extensively employed in making cider and vinegar. The peach and the plum, though somewhat less hardy than the apple, are nevertheless widely distributed through the more moderate sections of temperate zones, especially through southern Europe and the United States.

Marketing of Fruits.—The orchard products, and berries as well, are nowadays sent fresh to market, from great distances, by rail in refrigerator cars—or they may be dried in the sun or by some artificial evaporating process and the desiccated product sold under a new name. Thus sun-dried plums are *prunes*, dried grapes are *raisins*. Fruits are also preserved for an indefinite time by being cooked with sugar, or pickled, or brandied, and hermetically sealed before they are sent to market.

Vineyard Products. — Grapes are adapted to a wide range of climate, but the fruit matures most perfectly in localities having a long warm autumn, in temperate or subtropical regions.

The fruit, either fresh or dried as *raisins*, forms an article of commerce; but the principal purpose for which grapes are raised is for the manufacture of wine.

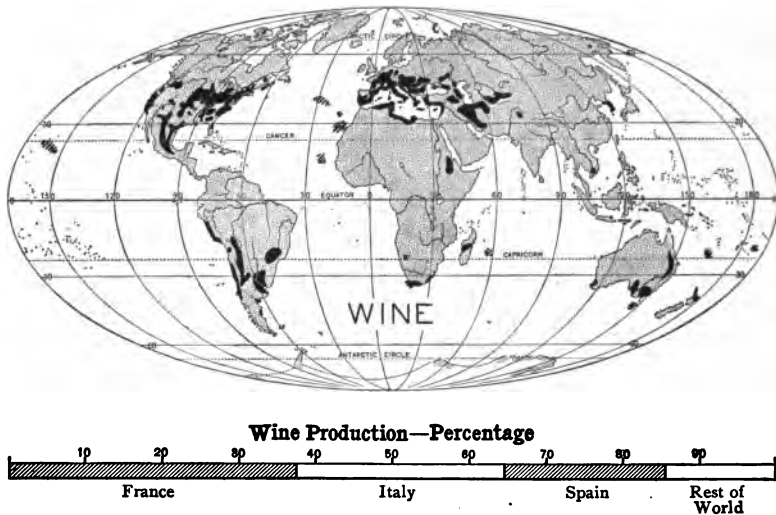


FIG. 41.

Manufacture of Wine. — Grapes suitable for the manufacture of wine are grown chiefly in central and southern Europe and in the eastern and the extreme western parts of the United States. In wine making, the grapes are carefully picked and pressed to extract the juice. The juice is then allowed to undergo a natural fermentation, until the sugar in the grapes, which exists in large quantities, is nearly all converted into alcohol and carbonic acid. Wine increases in value with age. Even the cheaper wines are kept from two to eight years, and some of the rich dark wines of southern Europe have matured for over one hundred years. The light wines of the north will not keep so well. During the maturing of the wine

the oxygen present combines with some of the ingredients, and thus gives to the wine its peculiar flavor or bouquet.

The character of the wine produced in different parts of the world necessarily varies with the composition of the grape juice, and this depends not only on the kind of grape and the degree of ripeness at which it is plucked, but also on the character of the soil in which it grows. The wines of the southern countries are the richest, as they contain more sugar than those of the northern countries. In some cases sugar is added to the wine juice. The skins and stems of the grapes are sometimes added during fermentation, both to improve the quality and to give to the wine an astringent taste, due to the tannin in the bark. Sparkling wines like *champagne*, first named from the district of Champagne, in France, contain an excess of carbonic acid gas. Imitation champagnes are often manufactured by the direct addition of carbonic acid gas to an inferior wine.

The wine-producing countries of the world are shown in Fig. 41. The chief wine-producing countries not named in the diagram are Austria-Hungary, Portugal, Germany, and the United States.

Berries and Nuts.—Berries are cultivated more extensively perhaps in the United States than in any other country. Those raised in this country, chiefly strawberries, raspberries, and blackberries, reach an annual value of \$25,000,000. Among the nuts, almonds, walnuts, and chestnuts are extensively cultivated in southern Europe, and English walnuts, almonds, and pecans in southwestern United States.

Tropical and Subtropical Fruits.—Among the more important tropical and subtropical fruits are oranges, grape fruit, lemons, limes, bananas, mangoes, plantains, cassava, breadfruit, dates, figs, cocoanuts, together with various nuts.

Oranges are cultivated in various parts of the world. Florida, California, and the West Indies are the principal sources for the supply of the United States. Oranges are raised also in the countries bordering on the Mediterranean Sea, this region being the principal source of supply for Europe, and in various parts of South America.

Lemons, limes, and grape fruit are grown in practically the same districts as oranges.

Olives are obtained from a tree that grows in various countries on the Mediterranean Sea, in India, Arabia, and southern California. India, Spain, Portugal, and France produce the greatest quantities. Olive trees are of a hardy growth. The wood is hard, close grained, and capable of taking a fine polish. The fruit consists of a species of plum, the flesh of which contains a great quantity of vegetable oil.

The olives are commonly picked when green, but of full size. Their bitter taste is removed by soaking them in a weak solution of lye. They are bottled in brine or pure salt, and, in some cases, cloves, cinnamon, and coriander seed are added to give them an aromatic flavor. The oil is separated from the ripe fruit by pressing, and is clarified and bottled for export. Olive oil is employed for a salad dressing, and also for the manufacture of fine soaps.

Dates are the fruit of a variety of palm trees that grow principally in northern Africa, near the Mediterranean, where they form the main food for both man and beast.

Figs are grown principally in the Mediterranean countries, in Asia Minor, and California.

Bananas and plantains, which because of their value as foods are important articles of commerce, are grown in various parts of the tropics. The plants bear fruit at nearly all seasons of the year, and are much used in the East and West Indies. The tender shoots of the plants also are employed as vegetables, and the juice is fermented into a kind of wine. The leaves of the plant are employed in making baskets and thatching.

Breadfruit is the pulpy fruit of a tree grown in the Friendly and Society Islands and in other parts of the tropics. When boiled, this fruit somewhat resembles the potato in taste.

Cocoanuts are the fruit of the cocoa palm. Besides the fruit, which is an article of food, the young foliage is employed as a vegetable. The leaves yield valuable fibers, and the trunk furnishes an excellent wood. Cocoanuts grow in Ceylon, Sumatra, Java, the Philippines, and the islands of Polynesia. *Copra*, an important article of commerce, is obtained by drying the meat of the cocoanut in the sun. From it is expressed cocoanut oil, used largely in making soap.

SPICES AND FLAVORS

Spices consist of various vegetable products that are employed to impart a pungent or agreeable taste to food. Among the chief spices are the following:—

Black pepper is the dried seed of a climbing plant. It is raised in the West Indies, Siam, the Philippines, and parts of the Malay Peninsula. The seeds, when ground, constitute the black pepper of commerce. If the black covering is removed, the seeds, when ground, form the white pepper of commerce.

Red pepper is the ground pods from a variety of plants that are cultivated extensively in various parts of the world, especially in Spain, Guiana, and other parts of South America.

Nutmegs are the seeds of a tree that grows in the Banda Islands, the Moluccas, Java, Sumatra, and the West Indies. The tree bears in the eighth or the ninth year, and afterward bears fruit and flowers together.

Cinnamon consists of the bark of the smaller twigs of a tree grown in Ceylon, the West Indies, and South America.

Cloves consist of the dried flower pods of an evergreen tree that grows in the Moluccas. It is extensively cultivated in Sumatra, Java, and the Indies.

Allspice, or pimento, consists of the unripe berry of a plant cultivated mainly in Jamaica. It grows also in Java, and in various parts of South America and the West Indies.

Ginger is extensively grown in India, southern China, tropical America, and western Africa. It is obtained from the root-stock of the plant. Large quantities are exported from Calcutta, and from Canton, China, where it is exported in the form of a candied preserve.

Mustard consists of the meal obtained from the ground seed of black and white mustard, a plant that grows in various parts of the world. Ground mustard is frequently adulterated with such impurities as starch and cayenne pepper.

Vanilla is a flavor obtained from the dried seed pods of a plant that grows in Mexico, Central America, and Brazil.

TIMBER AND LUMBER

The Principal Forest Regions of the world are shown in Fig. 7, p. 26. These forest regions are the source of the timber and lumber which enter the world's commerce and industries. The trees are known as *standing timber*. They are called *lumber* when they are cut down and are ready to be sent to the mill to be sawed into beams, planks, rafters, boards, etc.

In some parts of the world, timber, especially when cut into lumber, forms an important article of commerce. Much lumber is manufactured into various wares near its point of production, and these manufactured articles are then sent to all parts of the world. Certain valuable woods are imported in an unmanufactured state when they are found to meet some especial need. Such, for example, is the teak, which is imported from India, Burma, and Siam to Europe and this country for the woodwork in steel war ships, because it does not, like oak, corrode the steel. Mahogany is imported from the West Indies, Mexico, and Central America for furniture and interior decoration. Ebony and rosewood are imported from India and other countries for furniture and picture frames. The Philippines contain in vast quantity a great variety of valuable woods.

The principal wood-producing countries are the United States, Canada, and Russia. Of these, the United States leads. While in Russia some three fourths of the wood products are burned for fuel, only about one third is so used in the United States.

Hard and Soft Woods and their Uses. — Woods are employed for various purposes, depending on their texture, toughness, elasticity, specific gravity, durability, color, etc. To make good lumber a tree should be tall, straight, and free from knots. To form good material for the manufacture of *furniture* it should be fine grained, strong, tough, and capable of taking a high polish. For such purposes as *door knobs*, knots or gnarled parts are preferred. For the engraving of woodcuts, Turkish *boxwood* is used; *cedar* and *locust* form good fence posts; *hickory* is suitable for hoops and wagon tongues and whiffletrees; *red cedar* is used

for lead pencils; *persimmon* wood and *basswood* for bobbins; *poplar*, *tulip*, and *basswood* for wooden wares; *spruce* and *poplar* for wood pulp; and *oak* for barrel staves.

Where there are many railroads, immense quantities of timber are required for cross *ties*. In agricultural districts a great supply is needed for the *fences*. The principal use for lumber, when cut into boards, planks, etc., is for building houses, etc., and for the manufacture of furniture, agricultural implements, wagons, carriages, cooperage, and the manufacture of boxes. Oak, ash, maple, and pine are used for finishing the interior of buildings. The *bark* of various trees is employed by the manufacturer of leather for *tanning*. But the most important use for timber is for *fuel*, even in countries where coal is largely mined.

Destruction of Forests and Reforestation.—It takes more than a lifetime to mature a crop of large timber. In many parts of the world, where no care has been taken to replant the forest areas that have been cut, it has soon become almost impossible to do so, from the fact that the soil, no longer protected by the vegetation, has been rapidly washed from the surface. In other parts of the world, however, where care has been taken, the forests have been replanted, and in this way an abundance of wood is provided for coming generations. On the continent of Europe a large percentage of the forests belong to the government. In Germany, Austria-Hungary, Switzerland, and France the cultivation of forest lands has long been practiced. In England practically all the forest lands belong to the estates of the great landed proprietors. In the English colonies of India, South Africa, and Australia, the government controls the forests.

In the United States, where the great open forests of the north, the spruce and pine forests of the west, and the yellow pine forests of the south are still extensive, there has been until recent years no government control, but in the far west forest reservations have recently been made from the public domain, and Congress has enacted legislation for the preservation of these areas. Some of the states have also set aside forest reservations.

In those countries where the government is in control of the forests, various *schools of forestry* have been established. Such schools are common in

Germany, France, Switzerland, England, and India. Several have also been started in the United States.

Lumber. — The trees after they are cut down are trimmed and sawed into logs of suitable length. In the north the logs are hauled by teams during winter, when the snow is on the ground, to the banks of streams, down which they are floated to the various sawmills where the lumber is manufactured.

PAPER AND WOOD PULP

Paper derives its name from the papyrus, an Egyptian plant, from which the first material resembling paper was made, probably 4500 years ago. The Chinese, however, were the first to make paper from fibers reduced to a pulp.

The chief materials used in the manufacture of paper are wood (especially spruce and poplar), linen and cotton rags, straw, paper waste, and esparto. In countries where suitable woods are available, the lower grades of paper, especially for newspapers, are entirely made from wood. In the United States 75 per cent of the total tonnage of paper is made from wood pulp or wood fiber, and only 6 per cent from rags.

Manufacture of Paper. — The first step in paper making is to reduce the material to pulp. Rags are sorted, cleaned, boiled, bleached, and then beaten into pulp. Wood is converted, by grinding, into wood pulp, or, by being boiled with chemicals, into wood fiber. According to the chemical used, the product may be stronger or softer than the ground wood pulp, and it is often mixed with the latter to add strength or softness to the paper. The pulp is converted into paper either by hand or by machine processes, which are essentially the same in principle. The pulp is first diluted so as to separate the fibers. These are then interlaced in a mold, and the water is rapidly drained off. The moist fibers are spread out in thin sheets on flat surfaces covered with felt, and are pressed and dried. The surface of the paper is then smoothed by being pressed through a series of polished iron rollers, called calenders. For fine book printing, where an exceedingly smooth surface is required, the paper is sometimes coated by a mineral substance, such as china clay or gypsum, applied by brushes. The transformation of the fluid pulpy mass into paper is now mainly done automatically by machines, the best of which are able to produce as much as fifty tons of paper in twenty-four hours.

Kinds and Uses of Paper.—The chief classes of paper are writing paper, printing paper, wrapping paper, and paper boards. There are also many special kinds, such as tissue paper, blotting paper, wall paper, etc. In addition to its use in making paper, pulp is waterproofed and used for the inside of car wheels, for building materials, etc.

Principal Paper-producing Countries.—The paper industry centers in the United States, Germany, and Great Britain. Of the world's annual production of 8,000,000 tons, the United States furnishes nearly one half.

GUMS AND RESINS

Turpentine, Rosin, and Tar, generally known as *naval stores*, are products chiefly of the *pine forests* of southeastern United States. Formerly the trees were scarred, and notches were made under the scars to catch the sap as it ran out. At present, however, earthen cups are used in place of the notches, and the sap is gathered much as that of the maple sugar tree. The sap forms a gum or rosin, that is scraped from the trees and distilled. Four barrels of the gum will furnish one barrel of turpentine, and from the residue rosin is obtained. Turpentine so produced is employed in the manufacture and preparation of paints, varnishes for the solution of India rubber, and in medicine. Rosin is employed for the manufacture of cheap varnishes and soaps. Crude turpentine and rosin are important articles of export to Europe and Australia. Tar is obtained by distilling the pine wood, and is employed for calking the decks and sides, and in waterproofing the rope and rigging of vessels.

Gums and Resins.—Resins, insoluble in water, but soluble in alcohol, are obtained from various kinds of trees or vegetation that occur mainly in the tropics. Some of the principal resins are *gum copal*, an important resin exported from West Africa, South America, and the East Indies; *dammar*, from the East Indies; and *kauri gum*, a fossil resin obtained in lumps dug in the northern part of New Zealand, where extensive forests

of this resin-producing tree existed at one time. *Amber*, another fossil resin, found on the Baltic coast of Prussia, is used mainly in the manufacture of mouthpieces of pipes and cigar holders. Considerable quantities are exported into China, where it is made into ornamental articles. Resins are employed in the manufacture of varnishes. Gums soluble in water, but insoluble in alcohol, such as *gum arabic*, *gum senegal*, and *gum tragacanth*, are employed in the dressing of silks, crapes, and muslins, to stiffen the fabric, or in calico printing to prepare the cloth so that it will take the colors without running.

India Rubber, or **Caoutchouc**, is obtained from the juice or milk of a number of tropical trees, plants, or shrubs. In the

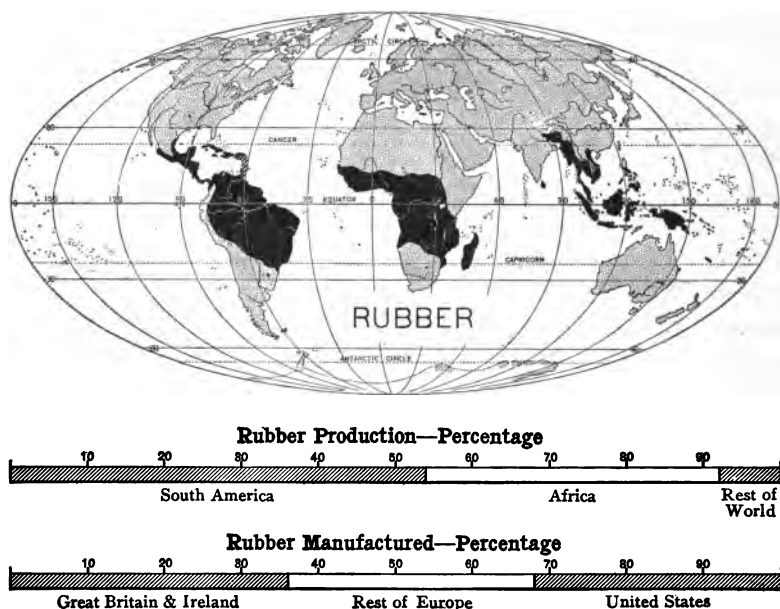


FIG. 42.

valley of the Amazon, and other portions of the rainy tropical forest regions, where the mean annual temperature is over 75° F., and the annual rainfall about 90 inches, rubber trees are

most abundant. Of all the rubber-producing regions, Brazil yields by far the greatest amount, producing about half the world's annual supply. Nearly two thirds of the rubber used in the United States and nearly one half of that used in Great Britain are imported from Brazil. Besides the rubber produced in South America, great quantities come from Central America, western and central Africa, and British India. Trees are now cultivated for this product.

Preparation of the Gum. — In the valley of the Amazon the trees are tapped by making an incision in the trunk. This is done usually at the close of the rainy season, when the quantity of milk in the trees is greatest. The milky juice is caught in cups, and resembles thick cream. It is coagulated in the smoke of a fire made of urucuri nuts. In Asia it is coagulated by salt water. Sometimes the juice is precipitated by alum. The material is subsequently fused, in order to insure the coalescence of the particles of rubber.

The cured gum is sent to the great rubber factories of Europe and America, where it is subjected to various processes of washing, so as to remove the dirt and other foreign substances. It is then dried, kneaded, and rolled into sheets, ready for cutting into the desired forms.

Manufacture of Rubber Goods. — In the early history of rubber manufacture this material was used chiefly for rubber boots, which were made by coating a form on the outside with rubber, from which it was afterwards separated. In 1823 Mackintosh, of Glasgow, invented a process for *waterproofing fabrics*, by means of which rubber coats, now known all over the world as *mackintoshes*, were produced. The use of such rubber goods was not at all general, because of the fact that they became sticky during hot weather, while in cold weather they readily cracked and thus lost their waterproof qualities. About 1840 Goodyear removed this difficulty by *vulcanizing* the rubber, or combining it with sulphur. Since this invention the manufacture of rubber goods in various forms has greatly increased. *Hard rubber*, or *vulcanite*, is obtained by employing

a greater degree of heat and by the addition of a much larger amount of sulphur during the process of vulcanizing. Hard rubber is employed for combs, rulers, pen handles, as an insulator in electrical work, and for various household purposes.

Gutta-percha. — Gutta-percha is a valuable insulating material employed in the construction of ocean cables. It is obtained from a tree that attains a height of from 60 to 70 feet, and grows in Borneo, Sumatra, and the Philippines. Some idea of the value of this material can be gained from the fact that, in the opinion of the best experts, it would be almost impossible to obtain a commercially working long submarine cable without this insulating material.

The gum from the gutta-percha tree is obtained by tapping the trees, and permitting the juice to dry. This crude gum is purified by throwing the shredded balls in cold water. The impurities sink, and the pure gum rises to the surface, after which it is collected, pressed, and kneaded into balls for export. The commercial product generally comes in masses weighing from five to six pounds.

Camphor is employed for preserving clothes from moths, for the preparation of liniments, and in medicine generally. It is used also in the manufacture of celluloid. It is obtained by steaming in water the leaves and wood of a tree, belonging to the laurel family, that grows in Borneo. Another variety of camphor is obtained from Japan and Formosa. Camphor is now largely obtained synthetically from turpentine.

DYESTUFFS, MEDICINES, AND ESSENTIAL OILS

Madder is obtained from the roots of a climbing annual which grows in various parts of the world. The roots are dried in kilns, thrashed and separated from the earth and dust, again dried, and pressed into molds. Madder yields a variety of different-colored dyestuffs; viz., red, pink, purple, black, and chocolate colored.

Indigo is a vegetable dyestuff, giving very durable blue dyes. It is obtained from various tropical plants, principally from

India, the Philippines, and Central America. Indigo is prepared by steeping the leaves and stems of the plant in water until fermentation sets in, which requires about fourteen hours. The clear, yellowish liquid that is thus obtained is placed in shallow vessels and exposed to the air for a few hours, when it is oxidized and precipitated in the form of a powder. This powder is washed, boiled for several hours in water, and the residue compressed into cakes that form the indigo of commerce.

Both indigo and madder dyes are now largely obtained from certain coal-tar products.

Quinine, or "Peruvian bark," is a valuable medicinal product obtained from the bark of the genus *Cinchona*, evergreen trees with laurel-shaped leaves, that grow on the eastern slope of the Andes. The trees are now largely cultivated in Ceylon, India, and Java.

Brazil Wood, Logwood, and Nicaragua Wood are employed for the production of yellow and reddish dyes. *Quercitron* and *black oak* produce yellow dyes.

Cork is the outer layer of the bark of a species of oak tree that grows in Spain, Portugal, and Algeria. It is generally used for stoppers for bottles, in the manufacture of life preservers, linoleum, etc.

Essential Oils, Fixed and Volatile. — Various natural oils exist either in the flowers, bark, etc., of plants, or in the juices, rinds, etc., of their fruits. These are called *essential oils*. *Essential oils are either fixed or volatile*. Fixed oils, such as oils obtained from linseed, walnut, poppy, etc., are used for painting on wood or canvas. They constitute the medium in which the colors are ground. Such oils are rendered drying by mixture with oxide of lead or zinc. Oil of turpentine is used mixed with paints as drying oil, being a volatile oil.

The principal volatile oils, which are obtained from the leaves, buds, flowers, and seeds of plants, consist of *oil of lemon, orange, bergamot, attar of roses, peppermint, lavender, cloves, pepper*, etc.



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FIG. 43. — A Cattle Range, United States.

CHAPTER X

ANIMAL PRODUCTS

Live Stock.—The principal domestic animals from which the raw materials of commerce are obtained are cattle, sheep, and hogs. In addition there are many other domestic animals, such as the *horse*, *mule*, and *ox*, in the temperate regions, the *reindeer* in the Arctic regions, and the *camel* in the desert regions, that are employed as beasts of burden (see Fig. 9, p. 30). Most of the domestic animals belonging to the temperate regions are raised on the farm, and furnish a large part of the returns of agriculture. In certain regions, however, where there are extensive grassy tracts, they are raised in great herds or flocks on ranches. *Hogs* are raised in corn-growing regions and in nut-producing forest districts.

Pasture Lands.—The best pasture lands are in the open grassy regions, such as the central parts of the United States, the steppes of southern Europe, Asia, and Australia, the llanos of the Orinoco, the pampas of the Plata, and the savannas of Africa. In these districts the supply of moisture, while sufficient for grass, is not adequate for forest growth and frequently not for agricultural crops. Steep mountain sides, where the soil is too thin to bear good crops, or the surface too rough for plowing, may also form good pasture lands.

Live Stock on Farms.—Some live stock is raised on nearly every farm, hence the farms in the aggregate produce an enormous number of cattle, sheep, and hogs. To these may be added the poultry, horses, mules, etc. All these, together with the

milk, butter, cheese, eggs, wool, etc., form valuable sources of revenue. The manure from the live stock is also of value as a fertilizer. Enormous as is this aggregate, it does not begin to equal the vast numbers of live stock raised upon the prairies of the United States, the plains of southern Russia, of Argentina, and the grazing lands of Australia. In the two last-named localities cattle and sheep live the year round on the natural grasses, which remain green the entire year on account of the mild winters.

Stock Breeding. — By properly crossing different breeds, so as to produce certain desirable peculiarities of flesh, milk, or wool, and especially by feeding to the stock the food best fitted to produce the desired products, great improvements have resulted in the character of the live stock. Improvements in transportation and in methods of slaughtering and packing have so bettered the quality and lessened the cost of production that packed and frozen fresh meats from the United States, Argentina, and Australia find ready sale in the English and continental markets.

Careful investigations have been made in the United States, Great Britain, Germany, etc., of the various diseases that affect domestic animals, together with the best methods of eradicating such diseases. In the United States government officers are appointed by the Agricultural Department to inspect animals slaughtered for food, in order to insure products that shall be pure.

Countries Producing Live Stock. — The greatest stock-producing countries in the world are the United States, Australia, Russia, and Argentina. Each of these produces more than twice as much as, and the United States three times as much as, any other country. The United States stands first in the number of cattle and hogs, while Russia stands first in the number of horses and second in the number of cattle. Australia stands first of all countries in the number of sheep and Argentina second — these two countries containing nearly half the sheep in the world.

ANIMAL FOOD PRODUCTS

The chief animal food is the flesh of cattle, hogs, sheep, poultry, and fish. In addition to this, however, dairy products (milk, butter, and cheese) and eggs are foods of animal origin that are extensively used.

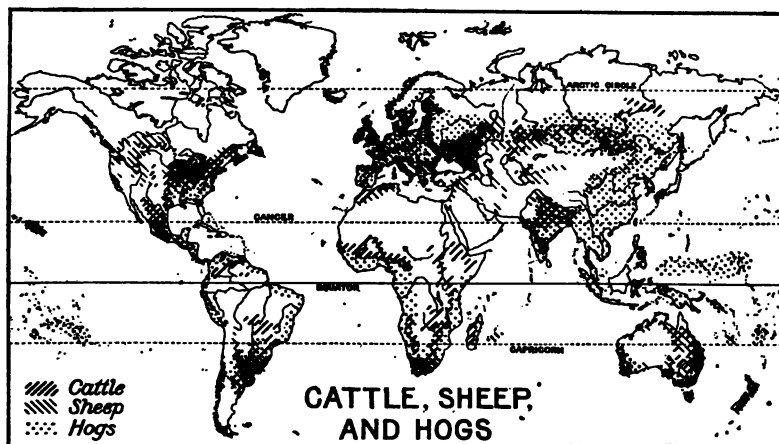


FIG. 44.

Meat. — When the meat is not consumed shortly after slaughtering the animal, various methods are adopted to prevent its putrefaction. This is accomplished by drying the meat, immersing it in solutions of brine, exposing it to the action of creosote present in the smoke by which hams and smoked beef are preserved; or subjecting it to refrigeration, that is, maintaining it at a low temperature, in which state it may safely be transported by rail or steamer to the destined points. Sometimes the meat is heated and preserved in cans, or extracts are prepared from the flesh by long boiling, or extracts so prepared are mixed with various cooked vegetables so as to produce soups. All of these, when canned, can with reasonable care be shipped to all parts of the world.

Meat-producing Countries. — The United States is the greatest meat-producing and exporting country. It is the source of probably one third of the world's product. Russia, Germany, Austria-Hungary, France, and Great Britain rank next as meat producers, but of European countries only Austria-Hungary, Denmark, Holland, Italy, Russia, and the Balkan States have a surplus of meat for export. Australia, Argentina, and Canada rank after the United States as meat exporters although they do not produce nearly so much meat as several of the European countries.

Dairy Products. — In some parts of the world large numbers of cattle are raised entirely for dairy purposes. This is especially the case in parts of the United States. Cows' milk, the only kind of milk that forms an article of any considerable commerce, is largely used for making butter and cheese. Cheese is made also from the milk of goats and sheep, and the milk of the buffalo is sometimes used in India for making a variety of butter. Mares' milk is employed in parts of Asia for producing a fermented beverage called *koumiss*.

Butter. — Milking is largely done by hand, but now instead of waiting, as in the olden times, for the cream to rise to the top of the open pans in which it is placed, it is separated by means of *centrifugal separators*. The butter is churned by machinery from the fresh cream, and may be ready for sale the same day that the milk is obtained from the cow. In the United States the yield from an average cow is about one hundred and forty pounds of butter a year. By care in breeding and in feeding, a marked increase in this amount can be obtained.

Cheese is formed by salting and pressing the curd and casein, together with variable quantities of fat in the shape of butter or cream, into molds; the cheese is then ripened by keeping. Different kinds of cheese contain varied proportions of fat, according to the character of the milk from which the cheese is made. Whole milk cheese contains a larger proportion of fat than skimmed milk cheese. *Cream cheese* is made from cream entirely, and contains from 60 to 70 per cent of fat.

The principal countries of production and consumption of butter and cheese are shown in Fig. 45. The heaviest exporters of dairy products are Holland, Canada, Italy, Denmark, and Switzerland.

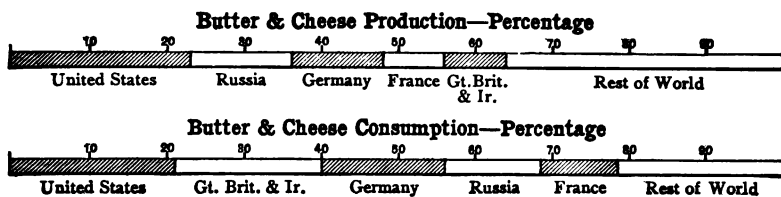


FIG. 45.

Poultry and Eggs.—Both poultry and eggs form important articles of domestic commerce in all civilized countries, and of foreign commerce in some countries. The United States probably leads in production, and approximately supplies the home demand. Eggs to the value of \$30,000,000 are exported and imported annually among European countries—Russia and Austria-Hungary being the greatest exporters and Great Britain and Germany the heaviest importers.

Fisheries.—The world's best fishing grounds for food fish are found in the shallower parts of the waters of the ocean that lie in the cold temperate regions of the Atlantic. Among the most famous of these are the banks off the coasts of Newfoundland and Nova Scotia, from which are taken cod, halibut, and haddock. The Atlantic coast of North America supplies quantities of herring, menhaden, shad, and bluefish; the rivers of Alaska and British Columbia and the Pacific coast yield millions of salmon; the Great Lakes produce white fish and sturgeon; while Chesapeake Bay yields the most and the best oysters in the world.

The Canadian fisheries, though less valuable than those of the United States, are enormous in extent. The Gulf of St. Lawrence, especially, is one of the most valuable fishing grounds in the world, and yields cod, herring, and mackerel in vast quantities.

Great Britain comes next to the United States in the importance

of her fisheries. The waters surrounding the islands teem with herring and pilchard. Japan has great fisheries, both around her islands and along the entire Asiatic coast. On the coasts of France there are valuable sardine fisheries. The fisheries of China are extensive. Figure 46 shows the principal fisheries of the world as well as the catch of fish by some of the principal countries.

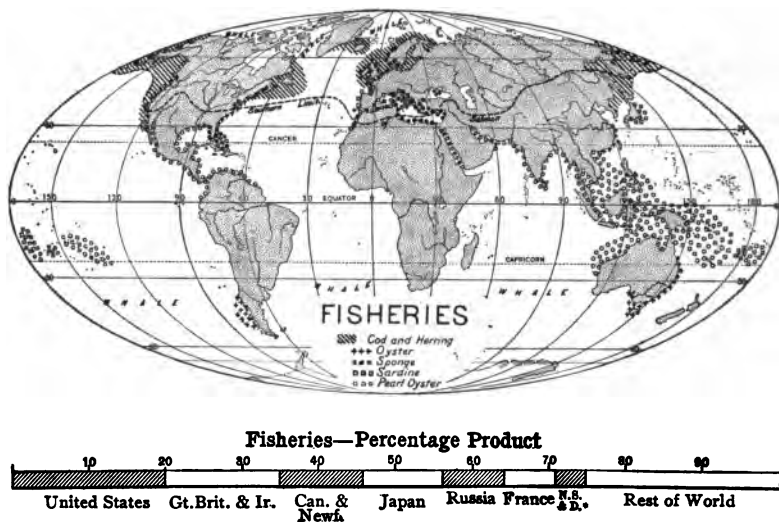


FIG. 46.

Methods of Fishing.—Cod are caught chiefly by trawls and hand lines. Trawls are frequently 3000 feet in length, and are anchored at either end with baited hooks. Cod trawl hooks are usually about 4 feet apart. The fish are collected once or twice a day, and the hooks rebaited. The cod when caught are immediately cleaned, salted, and stored in the holds of the vessels. The fisheries on the Grand Banks are very dangerous on account of the heavy gales and the risk of collision, in the dense fogs, with other vessels, or with masses of ice. Herring fishing is done in brush weirs, in gill nets, and in some places, in seines.

* Norway, Sweden, and Denmark.

The fish wheel is much used for salmon on the Columbia. It is a large, undershot wheel, the buckets being represented by wire nets, with open mouth facing downstream. The salmon swim into the net, and by a revolution of the wheel are tossed into a boat or platform to which the wheel is attached.

Shad are caught in large seines and in gill nets, the gill nets catching the fish by the gill covers.

Fish as Articles of Export. — The preparation of the fish for export varies with the character of the fish. Codfish are salted and dried. For drying they are spread out on open benches called *flakes*, accessible to the wind and sun. The fish are turned frequently and covered on the approach of fog or rain. Herring are prepared for export by salting for a fortnight, and are then dried for another fortnight while hanging over a wood fire. Large quantities of herring are packed. The salmon of the Pacific are mostly canned. The annual output of the salmon fisheries of our western coast is valued at \$16,000,000. Sardines are preserved in oil. Great quantities of small herring are canned as sardines in Maine. The roe of the sturgeon is salted and forms, especially in Russia and the Great Lakes, an article of commerce called *caviar*.

Oysters. — Oysters are obtained by dredging, or by the use of long-handled tongs. The oyster fisheries of the United States are of greater value than any other fishery in the country, and give employment to thousands of persons, yielding about \$14,000,000 per year. Oysters are found all along the Atlantic coast, but nowhere else in such great quantities or in such prime varieties as in the Chesapeake Bay. Oyster beds are planted at many places along the coast.

The United States Bureau of Fisheries. — In 1871 the United States government established the Fish Commission (now known as the Bureau of Fisheries), whose duty it is to restock exhausted rivers and lakes with fish, or to replace those already existing with species more suitable for their waters. This it does by hatching vast quantities of fish eggs, and placing the young fish, or fry, in the water to be restocked. The Bureau of Fisheries has done an immense amount of good in obtaining and disseminating information on fishes and fisheries of this and other countries. It has introduced valuable species of fishes from Europe, and has also introduced American fishes into

Japanese and European waters. It has also successfully introduced a few of the valuable food fishes of the Atlantic coast into the waters of the Pacific.

France was the cradle of fish culture, though now its government does little toward supporting fish hatcheries. In England the fish hatcheries are private enterprises for the restocking of private streams. There are fifty government hatcheries in Norway, and more than a dozen in Switzerland. Germany also pays a subsidy to a fish society, which encourages private hatcheries. Like the United States, Canada employs public money for restocking her streams and fishing grounds.

Honey and Wax. — In many parts of the country *apiaries*, where swarms of bees are kept, are maintained for the honey stored by the bees for their food. *Honey* is deposited in cells formed of *wax*. Both honey and wax form important articles of commerce.

ANIMAL PRODUCTS USED IN CLOTHING

Leather. — The skins of a great variety of animals are converted into leather by a process called *tanning*. The skins most used in the manufacture of leather are from *cattle*, *sheep*, *hogs*, and *goats*, although the skins of other animals, such as the *horse*, the *alligator*, the *deer*, the *walrus*, the *porpoise*, the *seal*, and the *snake*, are also used. The skins of the larger, heavier animals, such as the buffalo, the ox, and cattle, are generally called *hides*. Those of the smaller yearlings are called *kips*, and those of the smaller animals, *skins*.

In trade, hides are known as *raw hides* when they leave the slaughter pen; *salted hides* when they are rubbed with salt so as to preserve them during transportation before tanning; and *tanned* or *cured hides* after they have gone through the process of tanning. Hides and skins are obtained from various parts of the world, but they form important articles of commerce only in such countries as Australia, India, in several of the South American countries, and in some parts of the United States.

Manufacture of Leather. — After the removal of the hair or wool and after other preliminary cleaning, the skins are placed in vats lined with wood and filled with a solution of ground bark containing tannin. The barks chiefly used for this purpose in

the United States are the oak bark, which affords the best kind of tannin for heavy leather; and the hemlock bark. Willow bark is employed in Russia for the manufacture of Russian leather. The skins remain in the tan vats for weeks and even for months. In this way soluble matter, consisting of gluten, albumen, and gelatine, is rendered insoluble by entering into combination with the tannin. This renders the leather impervious to water, and also prevents it from putrefying. After removal from the vats the leather is softened with oil and colored, according to the purposes for which it is to be employed. Morocco and Russian leather, formerly produced only in Africa and Russia, are now produced in large quantities in the United States, which has grown to be one of the leading nations of the world in the manufacture of leather.

The real *Morocco leather*, which takes its name from the country in which it was first produced, is made from goatskins, highly colored on one side, and has a rough appearance, pur-

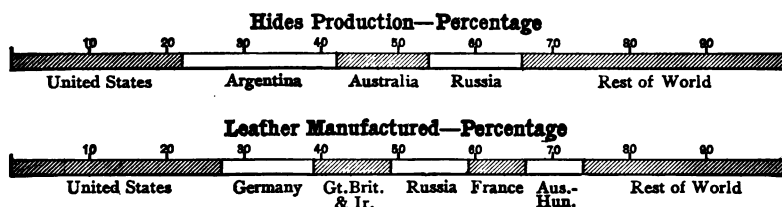


FIG. 47.

posely given to it by means of a stamp. It was introduced by the Moors into Spain, which country is now famous for its manufacture. In France large quantities of leather are produced for the manufacture of gloves, as well as patent or lacquered leather. In the diagrams the production and consumption of hides is shown. The United States, Germany, France, and especially Great Britain have to import many of the hides used. Argentina and Australia are the principal countries from which hides are exported.

Pelts and Furs.—The raw hide with the hair still on it is called a *pelt*. After the coarser hair has been removed, and it is

cleaned, softened, and cured, so as to keep indefinitely without putrefying, it is called a *fur*. Since fur is an extremely poor conductor of heat, it is extensively used in cold countries for clothing. Among the more valuable furs which come from the cold countries, may be mentioned the *sable*, *seal*, *beaver*, *sea otter*, *fox*, *wolf*, *wild cat*, *bear*, and *skunk*. It will be observed that all these are wild animals.

Fur-producing countries. — The principal fur-producing countries of the world are the northern parts of North America, Russia, and Siberia. The Hudson Bay Company, which for two centuries held exclusive rights to collect the furs in the North American district, is still engaged in this business. At the present time by far the most important of the fur-bearing animals are the *fur seals*. These animals have been nearly exterminated in the waters of the Antarctic Ocean, and even in the Arctic regions they are found to be flourishing only on two groups of islands in Bering Sea; viz., in the Pribilof Islands, which lie in the United States, and the Commander Islands, which belong to Russia.

To protect the Pribilof seals the United States granted to a single company the exclusive right to kill them, under certain restrictions; viz., only young grown males were to be killed and only a certain number annually. But both Americans and Canadians have killed the animals in the open sea without regard to age or sex. In consequence of this "pelagic fishing" the seals are becoming exterminated, and the price of sealskins has greatly increased. Many seals are caught also on the coasts of Labrador and Newfoundland and in various other parts of the world, but these are hair seals. Their skins are used for leather and they yield a valuable oil.

One of the most valuable furs is that of the *sable*, which is so rare that a single skin of the first class may bring as high a price as from \$800 to \$1800. The sable lives in Siberia and Kamtchatka. Another extremely valuable fur is that of the sea otter, once common in Alaskan waters, but now so rare that good skins bring an almost fabulous price. The *beaver*, formerly abundant in the rivers and smaller streams of North America, is now comparatively scarce. The fur of the *silver fox* and the less valuable furs of the *cross fox* and *red fox* are

also becoming scarce. Of *bearskins* used for rugs and overcoats, those of the *black bear* are the commonest, but in the northwestern part of North America the *grizzly*, *cinnamon bear* and the *brown bear* are still common. The skins of various species of *wolves* and *wild cats* are used to some small extent.

Felting for Hats.—The short or under hairs from rabbits, hares, muskrats, coons, etc., are employed by the hatter for felting in the manufacture of hats. The cleansed hair is either beaten and rolled or treated in some other way until it adheres so as to form a sort of natural cloth. In the manufacture of hats the fur is fitted on suitably shaped forms, much larger than the hat, and afterward shrunk and shaped by heat into the desired form and size.

Wool.—The hair of the sheep and some other animals forms a valuable article of commerce, being employed in the manufacture of clothing. It is admirably adapted for this purpose, since it is a poor conductor of heat, resists moisture, and is better for many articles of clothing than cotton. Wool is naturally curly, and when stretched, readily lengthens, but as readily regains its original length when the strain is relieved; hence, woollen garments are elastic. The edges of the wool fiber are serrated, like the teeth of a saw. These serrations are extremely small, there being sometimes three thousand in the length of an inch, so that they can be detected only by the microscope. It is these serrations or teeth that permit the wool to be readily spun into yarn, or felted or beaten into cloth without weaving; since wool, like fur, can be felted like hair.

Sheep Raising.—Sheep may be raised in a great variety of conditions as to soil, climate, and the character of the pasturage. These differences are shown in the character of the wool, an arid highland region giving a fine soft wool and a wet lowland a harsh, coarse quality. The famous Merino sheep, introduced from Africa into Europe, thrive in the dry climate of the Spanish peninsula, as well as in that of Australia and southern California. The regions selected for pasturage are generally situated in some thinly settled district, where a great

extent of country is available, or on hillsides where other animals are not able to feed with comfort.

Sheep are sheared every year, generally in the spring. Before the wool is ready for weaving into cloth, it must be cleaned and freed from the animal grease. This is done by scouring, washing, and drying. The matted flocks of wool are then separated, the fibers oiled, so as to render them more pliable, and the product is then ready for *carding*, *spinning*, and *weaving*, these processes being carried on in much the same way as in the manufacture of cotton.

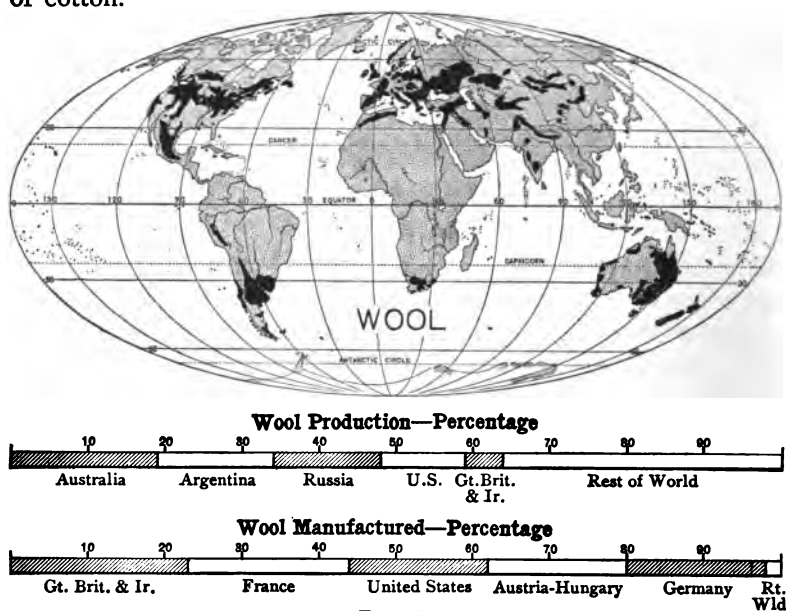


FIG. 48.

Wool-producing Countries.— Figure 48 shows the principal wool-producing and wool-manufacturing countries. It will be seen that a very large proportion of the raw wool produced is exported.

Grades of Wool.— As an article of commerce wool is divided into various classes. The short staple wool, which seldom exceeds 3 or 4 inches in length, and which is generally em-

ployed in the manufacture of clothing, is called *carding wool*; the long staple, or *combing wool*, varies in length from 4 to 8 inches. Most of the finer wools are the *short staple*; while the coarser wools are the *long staple*. Certain of the wools of Persia and Turkey in Asia, which do not felt readily, are used in the manufacture of rugs and carpets.

The fineness of wool obtained from the same animal varies in different parts of its body, that obtained from the back, sides, and shoulders being far better than that from other parts. These different varieties obtained from different parts of the same animal are divided into grades called *primes*, *seconds*, and *thirds*.

Varieties of Wool. — Other animals besides sheep produce excellent wool. The *alpaca*, an animal related to the llama, yields a wool of extreme fineness and length. The white, silky wool of the *Angora goat* is known in commerce as mohair. The *Cashmere goat*, from whose wool the famous cashmere shawls are made, has short, but soft and lustrous, wool.



FIG. 49. — Feeding Silk Worms, Japan.

Silk. — Silk is a fiber of great elasticity and strength, obtained mainly from the cocoon of the silk worm or mulberry moth. The

eggs of the moth are naturally deposited on the mulberry tree, on the leaves of which the worm feeds when hatched. The operations are now carried on under roof, where the leaves are brought to the worms. After the worm attains its full growth it spends three or four days in spinning its cocoon, which, when finished, is about $1\frac{1}{2}$ inches in length, and of a bright yellow color. Before the pupa develops into the moth, the cocoons are exposed to a degree of heat sufficient to destroy life, and the long fiber surrounding the cocoon is then drawn out and reeled, the fibers of several cocoons being united to form one thread of fine quality. Where a coarse thread is desired, the fibers from as many as twenty-five cocoons are united into a single thread. The reeled silk is then made up into hanks, in which condition it is exported as raw silk to the silk manufacturing centers.

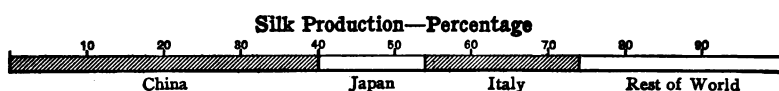


FIG. 50.

Figure 50 shows the silk-producing countries of the world. The labor involved in the care of the worm during its feeding season, and that required to prepare hanks, is so great that only where labor is very cheap can silk be raised profitably.

The length of the silk fiber does away with the necessity for the preparatory processes required in spinning the shorter fibers of cotton, wool, and flax into yarn or thread, so that the fiber is ready almost at once to be woven into the various kinds of velvet, satin, or silk. The waste products of silk, known as *spun silk*, are used in making cloths of inferior quality, the fiber known as plush being largely made from spun silk.

Textile Manufactures.—In the manufacture of textiles the United States and Great Britain are the leading countries of the world. Although it will be noticed in Fig. 33, p. 101, that the United States manufactures a larger amount of the world's product of raw cotton than Great Britain, the value of the cotton goods manufactured in Great Britain is greater than in the United States, owing to their finer quality. In woolen

manufactures, Fig. 48 shows that Great Britain, France, United States, Austria-Hungary, and Germany furnish nearly the whole supply, while Fig. 35, p. 103, shows that in the manufacture of linen, United States, France, and Great Britain are the leading nations, producing about 45 per cent of the world's product. In the manufacture of silk outside of China and Japan, France is the leading country, with the United States and Germany coming next in importance.

Textiles are colored by means of dyes. Some dyes, as indigo, will unite directly with the fabric to color it. Others, such as logwood, will not dye the material unless an auxiliary called a *mordant* is employed. In printing patterns on calico, insoluble substances called pigments, such as lampblack, are fixed on one surface of the goods by means of albumen, which acts like a varnish or glue to hold them.

Materials for Clothing. — The materials for clothing, viz., textiles, leather, rubber, lace, feathers, etc., are mainly manufactured products, and are used as semi-raw materials in the clothing factories, tailoring establishments, shoe shops, etc., where they are converted into articles of clothing. Much of the clothing produced under the factory system is not made in the factories, but in the homes of the hands.

OTHER ANIMAL PRODUCTS

Bristles are the stiff, glossy hairs of the wild boar and hog. They vary in color, being white, yellow, gray, brown, and black, the first being the most valuable. Hogs, bred so as to produce a fine quality of flesh, do not furnish bristles possessing much commercial value. *Bristles* are employed in the manufacture of brushes, such as *toothbrushes*, *hairbrushes*, etc. They are obtained mainly from Russia, China, and Germany.

Hair. — The hair removed from skins and hides is often mixed with plaster to serve as a binder. *Curled hair*, for stuffing mattresses, cushions, and upholstery is obtained largely from horses. It is first washed, then dried in a hot oven, and curled. The

long hairs are woven into a variety of cloth called *haircloth*. The finer hair is employed for *violin bows*, etc. *Human hair* forms an important article of commerce. It comes largely from Germany, Italy, Spain, and China.

Horns, hoofs, and other animal tissues, when washed in lime water, boiled and strained, cooled in the form of thin sheets, cut into pieces, and dried on nets, form *gelatine* of which *glue* is a coarse variety. The tips of horns are sometimes used directly for *knife handles*. The hollow parts of the horns are boiled in water until they are soft, when they are slit open by a knife, and pressed out between plates in the shape of fairly thin leaves. These leaves are then heated, and shaped under pressure into a great variety of forms.

Bones.—The large white bones are sometimes worked directly into *knife handles*. They are used also in various other ways. For example, they are sometimes cut into *buttons*; or are carbonized by heat in closed vessels and converted into *animal charcoal*, largely employed in sugar refining; they are manufactured into fertilizers; or they go to the chemist, by whom they are employed for the extraction of the phosphorus employed in the manufacture of matches.

Bones constitute an important article of commerce, and are exported from Russia, India, and various South American countries to Great Britain, Germany, France, and the United States.

Ivory, an animal product obtained from the tusks and teeth of certain animals, differs from bone in having a finer structure and greater elasticity. It has a beautiful white color, and takes a high polish. Its elasticity admirably adapts it for use as billiard balls. It is employed also for handles of cutlery, piano keys, and for various ornamental purposes, such as carvings, etc.

The principal source of ivory is the tusks of the elephant, the hippopotamus, and the walrus. The best ivory is obtained from the African elephant in the Congo region. Much, however, comes from Asia.

An immense quantity of ivory comes in the shape of fossil ivory, from the islands off the coast of northern Asia and the adjoining shore lands.

Ivory cutting is done largely in Russia, China, and Japan.

A tropical palm, grown in America, yields a hard, white nut, employed as a substitute for ivory, and known in commerce as *vegetable ivory*.

Fats, Oils, Soaps, and Candles. — Various fats and oils are obtained from different animal products. *Lard* is obtained from the fat of hogs; *tallow* is obtained from the harder and less valuable fats of cattle and sheep. Tallow is used in the dressing of leather, and for the manufacture of candles. *Lard oil*, employed for lubricating and illuminating purposes, is obtained from lard.

Various fats and oils are combined with potassium and sodium salts to produce *soaps*. For this purpose the fats of palm and olive oils are boiled with caustic soda or potash until a change called *saponification* sets in, when the fats or oils are converted into soap by a part of their ingredients combining with the potash or soda. The remaining ingredients of the fats, mainly *glycerine*, remains in a liquid state. Salt is then added to the mixture. The soap, removed and separated from its excessive alkali and glycerine, is well known in the household.

Fish Products. — Fish produce a variety of secondary products that are of great importance. The refuse is employed in the manufacture of *glue*, *oil*, and *fertilisers*. Large numbers of the menhaden are caught off the American coast for the oil extracted from them and for use as fertilizers. The menhaden forms the principal part of the food of the bluefish and Spanish mackerel and other valuable food fishes of the Atlantic seaboard, and it has been estimated that were the menhaden to disappear three fourths of the value of American fisheries would vanish.

Whale Fisheries. — Another marine animal which once played an important part in the fisheries of the world, is the *whale*. Whales are now found almost entirely in the northern waters. The whale yields from its blubber an oil known as *train oil* and

one variety is prized for the *whalebone*, which is found in long thin plates in the whale's mouth. Spermaceti and sperm oil are found in the head cavities of the sperm whale.

Sponges. — The sponges of commerce are the horny skeletons of a low order of marine animals. The living animal consists of a soft fleshy mass, which attaches itself to some support, and gets its nourishment from the minute life in the passing currents.

Sponges occur in many species and grow in most waters, but the commercial species are confined to the warmer seas, especially the Mediterranean, the Caribbean and the Gulf of Mexico, and the seas around the Bahamas. Sponges are obtained by diving, dredging, and trawling. They are cleansed of their readily putrefiable substances by maceration in sea water after being killed by exposure to the air. The horny skeletons are often bleached with chemicals but the durability is thereby impaired. The finer sponges come from the Mediterranean; but the best grades of Florida sponges are unexcelled for many uses in the arts and for ordinary bath purposes.

Cochineal. — Cochineal is a valuable animal product employed in the manufacture of scarlet and carmine dyes. It is obtained from dried insects that live on a variety of plants growing in tropical climates.

Shellac is a resinous incrustation produced by a parasitic insect that occurs on the twigs and branches of trees that grow in the East Indies. Shellac is employed in the manufacture of varnish, and forms a valuable insulating material much employed in electrical apparatus.

CHAPTER XI

MINERAL PRODUCTS

The more important minerals consist of compounds of silica (quartz), as sandstone, flint, agate, etc.; of alumina, as shale, slate, clay, etc.; of magnesia, as soapstone, talc, etc.; of calcium, as limestone, marble, etc.; together with mineral fuels, as coal, petroleum, and natural gas, and the various compounds or *ores* of iron and other metals.

Distribution of Minerals. — While one or more of the rock-forming minerals mentioned above compose the rocks near the surface in all parts of the world and are thus very common, the mineral fuels and metallic ores, though widely distributed, are confined to more circumscribed regions and are much less common and plentiful. The metallic ores are associated with the various geological formations, where they may occur in veins or lodes filling fissures in the rock layers, as is more particularly the case with the various sulphides and the precious metals, or in beds intercalated between or parallel with the rock layers, as is often the case with iron ores. The best coal is found in rocks of the carboniferous age, though inferior grades of coal exist associated with more recent rocks. Both kinds are intercalated between the layers of the rocks.

Minerals may be broadly classified as the *metallic* and the *non-metallic*.

METALLIC MINERALS

Iron is by far the most valuable metallic substance known, its production in the United States being nearly four times the value of the gold and more than four times that of the copper produced.

Distribution of Iron Ores. — Ores of iron are very generally distributed in all parts of the world. In order, however, that iron may be manufactured in any district to compete in the open market with iron manufactured elsewhere, it is not only necessary that the deposits shall be large and pure, but also that they shall occur either in sections of the country where transportation is cheap and reliable, or in regions where the necessary fuel and limestone required to reduce the ore to the metallic state can be readily obtained.

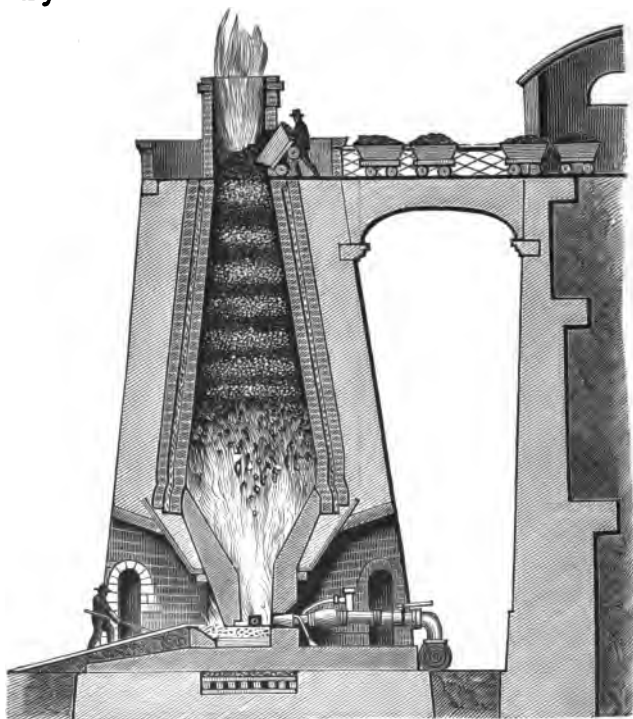


FIG. 51. — Section of a Blast Furnace.

The ores employed in the manufacture of iron and steel consist, for the greater part, of oxides of iron, called *red* and *brown hematites*. The former is more valuable than the latter, since it is richer and in general purer. Either sulphur or phosphorus, especially the latter, is very objectionable in iron ores employed in the manufacture of steel. Another oxide, *magnetite*, is also a

valuable ore, but not so abundant. It occurs both in massive deposits and in the shape of fine sand. Metallic iron occurs naturally only in small quantities in masses called *meteorites*.

Manufacture of Iron.—Iron ores are *smelted*, or reduced to the metallic state, in a *blast furnace*. A section of such a furnace is shown in Fig. 51. Such furnaces, when large, are sometimes several hundred feet in height. The iron ore, coke, and limestone are placed in alternate layers in the upper part of the furnace in the proportion of about one and two thirds tons of ore, somewhat less than one ton of coke, and about one half a ton of limestone.

The furnace is closed at the bottom. Combustion is effected by means of hot blasts of air forced into the lower part of the furnace. As the melted mass sinks in the furnace, fresh materials are added above, the furnace being kept in blast night and day continuously for months. The oxide of iron is reduced to the metallic state by combining the oxygen with the carbon. The silica and other foreign materials in the ore combine with the lime and form a slag. Both iron and slag sink to the bottom of the furnace, the slag floating on the top of the molten iron. At regular intervals the molten iron is drawn from the furnace and either converted at once into steel or run into molds as cast iron, in the form called *pig iron*. The slag is drawn off more frequently.

Manufacture of Steel.—Cast iron is converted into steel by certain processes, which remove nearly all the carbon with which cast iron is combined. One of the processes most employed for this purpose is that invented by Bessemer, in 1860, and called after him the *Bessemer process*. This method consists essentially in burning out the excess of carbon in a *converter*, by forcing a current of air through the molten metal. This leaves the metal nearly pure and essentially wrought iron. *Spiegeleisen*, containing the proper amount of carbon and manganese, is now added to the liquid mass to convert it into steel of the quality desired.

On account of the saving in cost effected by the Bessemer process, steel has almost entirely replaced wrought iron, and many new uses have been found for it. The Bessemer converter, as shown in Fig. 52, is mounted on trunnions, so as to be tilted and thus empty its contents.

Sometimes the excess of carbon is removed from the cast iron by blowing a stream of air through a mass of molten material exposed on an open hearth, as in the Siemens-Martin process.

Iron and Steel as Articles of Commerce. — Figure 53 shows that the United States produces 33 per cent of all the iron, and more than 37 per cent of all the steel, produced in the world. Great Britain and Ireland import a large quantity of iron ore from Spain and Sweden. In the United States an immense traffic is carried on between the Lake Superior mines and the iron-manufacturing districts along the shores of the lower lakes and in western Pennsylvania.

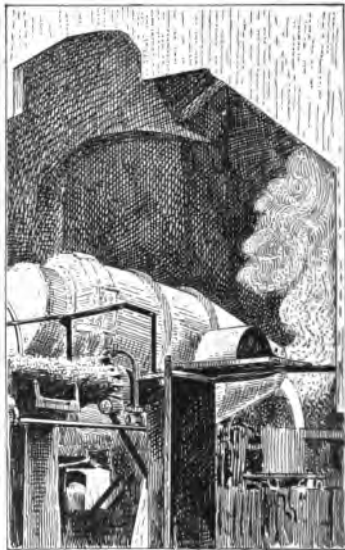


FIG. 52. — Bessemer Converter.

In the United States five sixths and in Germany nearly three fourths of the iron produced is converted into steel, while in Great Britain a little more than one half and in France nearly two thirds is so converted.

Copper is one of the few metals that occurs in a native or pure state. In the Lake Superior district it occurs in veins, sheets,

or masses, or in small particles disseminated through the rocks. Sometimes large masses of pure copper are found, but it is almost impossible to handle them with profit. Nearly all the copper now mined in this district is obtained at great depths,

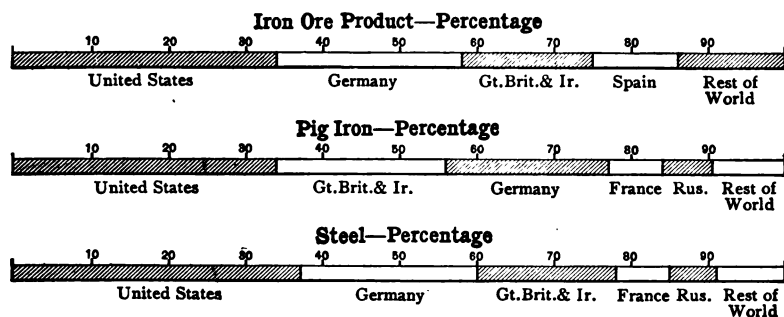
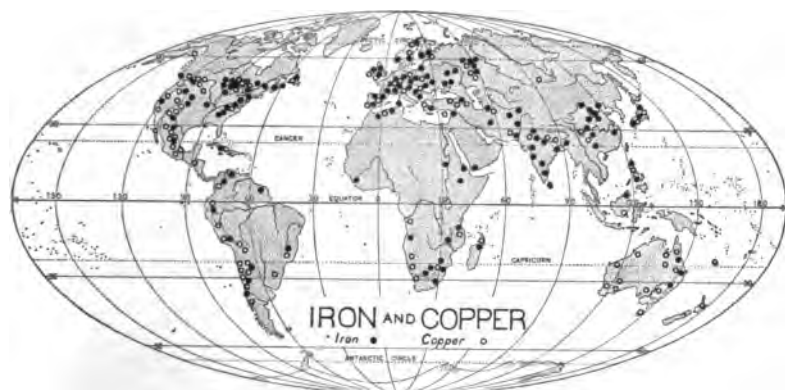


FIG. 53.

from the finely disseminated deposits. Copper occurs also in the form of oxides, sulphides, carbonates, etc. These are called secondary ores. It is sometimes associated with other metals, such as bismuth, silver, and gold.

Copper is obtained from the ores by various processes. In the *leaching process* secondary ores, such as the oxides and carbonates, are placed in tanks and dissolved by a weak solution of sulphuric acid and water. The metallic copper is separated from this solution by the addition of metallic iron. Other

ores of copper are reduced by various smelting processes. When sufficiently reduced by concentration, copper ore forms an important article of commerce, being shipped to smelters in different parts of the world.

Uses of Copper. — Copper is employed in the arts for a great many purposes. Being one of the best conductors of electricity, it forms an essential part of nearly all electrical machinery and construction. It is used also as an alloy in the manufacture of brass, bronze, and German silver. It is employed in the manufacture of boilers and retorts, for sheathing ships, covering roofs and cornices of buildings, for coinage, for copper-plate engraving, and in the manufacture of green paint.

Distribution of Copper. — Figure 54 shows the copper production of the principal countries of the world. About one half of

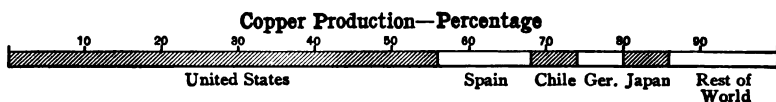


FIG. 54.

the copper ores of the world, except those of the United States, are smelted at or near Swansea, Wales.

Gold. — Gold is one of the most generally distributed of all the metals, occurring in the rocks of practically all the different geological formations.

Gold occurs *pure* or *native* in veins, and only a simple separation of the gold from the metal-bearing rock, or gangue, is required. The gold commonly occurs in the form of minute scales, or finely divided particles, in the quartz. In separating it, the gold-bearing quartz is reduced to fine powder in stamp mills in the presence of water. The gold is extracted from the wet powder, by being passed over copper plates covered with mercury or quicksilver, which dissolves the gold and allows the lighter mineral matter to be washed away. The gold collected on the plate forms an *amalgam* with the mercury. By heating the amalgam the quicksilver is then vaporized, leaving the gold. Gold ores that are capable of being treated by stamp mills are called *free-milling* ores.

Sometimes the *cyanide* process is employed. Here the gold is dissolved in a solution of potassium cyanide. This method is frequently used for treating ores containing finely divided gold or the *tailings* left after it has passed through the washing and amalgamating process. Chloridizing, or treatment of the powdered mass with chlorine gas under pressure, is also

extensively employed. The Elmore process of concentrating with oil as well as water greatly reduces the cost.

In some cases gold occurs in *placer deposits*, where it is found in small particles distributed throughout beds of gravel, sand, or finely decomposed rock. In such cases the metal is obtained by what is called *hydraulic mining*, where a powerful stream of water washes sand and gold alike through long, narrow, inclined troughs called *sluices*. Across the bottom of the sluices cleats are placed, and as the gold-bearing gravel is washed down the sluice, the heavy gold is caught behind the cleats and held by the mercury. In some places the washing is still done by hand. Sometimes the gold occurs in comparatively large masses called *nuggets*.

Uses of Gold. — Gold is one of the most ductile and malleable of metals, and does not readily tarnish when exposed to the air.

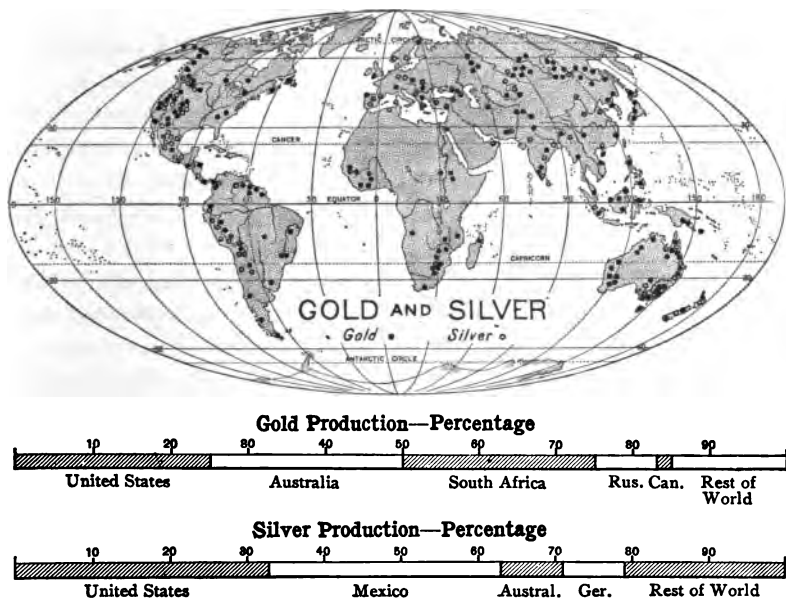


FIG. 55.

It is extensively employed for coinage, in the manufacture of jewelry, and in all gold plating.

Where considerable wear is to be expected, as in coinage and jewelry, gold is hardened by being alloyed with silver and

copper. Such alloyed gold is divided into classes, according to its fineness or the proportion of pure gold it contains; 18-carat gold contains 18 parts of pure gold and 6 of alloy; 16-carat gold contains 16 parts of pure gold and 8 of alloy; and so on. Figure 55 shows the distribution and production of gold and silver.

Silver.—The principal ores are sulphides, although silver also occurs as carbonates and chlorides. The silver is extracted by smelting and refining processes.

Principal Uses of Silver.—When silver is employed for *coinage*, on account of its softness it is alloyed with copper. In the United States, silver coinage is nine tenths fine; *i.e.* it contains one tenth of copper. Silver is employed also in the manufacture of silverware, watch cases, and jewelry. Large quantities of silver are employed also in silver plating and in photography.

Lead.—Lead occurs in various forms. The principal ore is the sulphide known as *galena*. Much galena is *argentiferous*, that is, silver-bearing, and much lead is produced as a by-product in the production of silver. Some galena is *auriferous*, or gold-bearing.

Principal Uses of Lead.—Lead is employed in the manufacture of lead pipes, for electric storage batteries, for lining tanks, covering roofs, for making bullets, and for many other purposes. Lead forms valuable *alloys*. With antimony it forms *type metal*, used for casting type. With tin it forms *solder*. Lead also forms various chemical compounds which are employed in large quantities in the arts. Carbonate of lead is used in the manufacture of *white paint*. The oxide, another compound, is employed in the manufacture of *flint glass*.

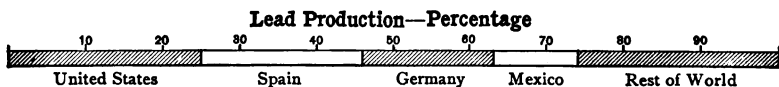


FIG. 56.

The principal lead-producing countries are shown in Fig. 56. Australia and Great Britain also produce considerable quantities.

Zinc. — Zinc occurs in various ores, the principal of which are the sulphide, or *jack*, the silicate, and the carbonate. In the United States zinc ore occurs in the same localities as the galena, sometimes mechanically mixed with the galena. The two ores, however, are readily separated by means of concentrators, owing to the difference in their specific gravity. Belgium produces nearly 40 per cent of the total product, and the United States about 25 per cent. The principal mines of zinc in the United States are in the Galena-Joplin district of Missouri and Kansas. Zinc also is mined in large quantities in various parts of western Germany, in the neighboring parts of the Netherlands and Belgium, in eastern Prussia, France, Great Britain, and Austria.

Principal Uses of Zinc. — Zinc is used for *galvanizing sheets of iron* to prevent the iron from rusting. This galvanized iron is used in large quantities for roofing, and for the manufacture of cornices, gutter spouts, and water pipes. Galvanized plates have been used to a limited extent in the construction of portable houses.

Zinc, when alloyed with copper, forms *brass*. With copper and tin it forms a variety of *bronze*. When burned in the air, zinc combines with oxygen and forms an *oxide of zinc*, called *zinc white*, used in the manufacture of paint.

Aluminium is a metallic substance which, in combination with oxygen, silicon, and other elements, is very widely distributed over all parts of the earth. Aluminium has come into general use only at a comparatively recent date, owing to the difficulty of extraction from its compounds. Lately, however, cheap electrical methods of extraction have been perfected, and it is rapidly coming into general use. Aluminium is ductile, malleable, and capable of taking a high polish, which, since it does not readily rust, it retains. It is a good conductor of heat and electricity, and is extremely light.

Aluminium is employed to some extent for electric conductors, in place of copper conductors. It is employed also in the manufacture of metallic articles where lightness without great

strength is desired. Great quantities of the metal are now produced in the neighborhood of Niagara Falls, where the electricity necessary for its production is obtained.

Mercury or Quicksilver, though sometimes occurring in the metallic state, is generally found in the shape of a *sulphide of mercury or cinnabar*, from which the metal is extracted by distillation. The mercury is shipped in iron flasks containing generally 76½ pounds each.

The principal use of mercury is in the *amalgamating process* for the extraction of gold from free-milling or placer gold ores. Mercury is employed also in the construction of barometers and thermometers, in the operation of various forms of mercury pumps employed in the exhaustion of incandescent electric

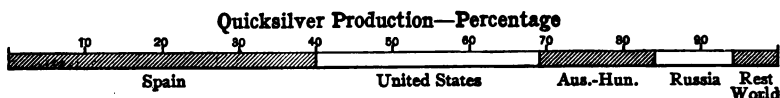


FIG. 57.

lamps, for the formation of *amalgam* for silvering looking-glasses, for the manufacture of an alloy employed by dentists in filling teeth, and for other purposes. Some of its chemical salts are employed in medicine, as *calomel*, and *corrosive sublimate* used in surgery and for pigments. Figure 57 shows the chief sources of this metal.

Antimony is a valuable metal that enters into the composition of type metals, as already mentioned. Although produced in the United States, the chief supply is from Germany.

Platinum, one of the heaviest of the metals, occurs both in a pure state, and alloyed with other metals. One of its principal uses in the arts is for the leading-in wires of incandescent lamps, X-ray tubes, and other vacuum tubes. It is used also in the manufacture of vessels employed in the chemical arts. The largest deposits are found in the Ural Mountains.

Tin. — Although the ore of tin, called *cassiterite*, is mined, the chief source of the metal is placer deposits in the form of finely divided sand, called *stream tin*. The principal use of tin is in

the manufacture of *tin plate*, in which sheets of iron are covered with a thin protecting cover of tin. Tin forms a number of valuable alloys. *Terne* consists of plates of sheet iron or sheet steel, covered with an alloy of tin and lead. With copper it forms *bell metal* and a variety of *bronze*. With lead it forms *pewter*. Figure 58 indicates the distribution and the actual sources of tin.

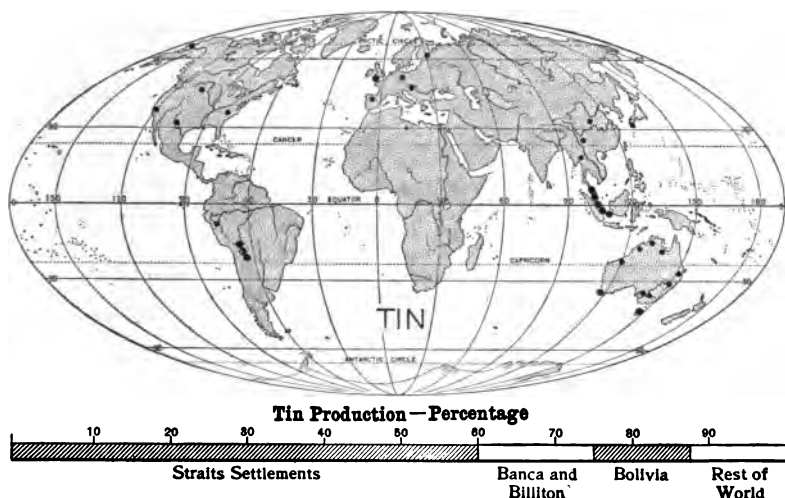


FIG. 58.

The Manufacture of Metals is carried on almost entirely by the United States, Great Britain, and Germany, which produce about nine tenths of these products, the United States producing about four tenths, Great Britain three tenths, and Germany somewhat less than two tenths.

NON-METALLIC MINERALS

Non-metallic Minerals.—The total value of the various non-metallic minerals produced in the United States in 1900 was about \$566,000,000, as against \$525,000,000 for metallic products. By far the largest items in the values of non-metallic mineral products are those of coal and petroleum. These minerals are produced in enormous quantities.

Coal. — Coal, which is the accumulated carbonaceous matter resulting from partial decay of plant life in past ages, is found in nearly all parts of the world. At the present time only those deposits which are readily reached are being mined. The distribution of coal-mining regions and the production and consumption of coal in the different countries is shown in Fig. 59.

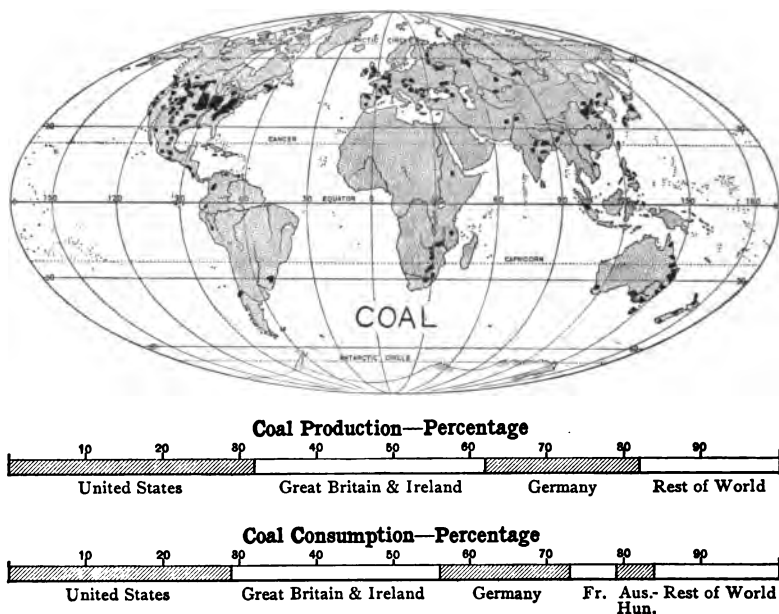


FIG. 59.

About one fifth of the quantity of coal produced in the United States is *anthracite*, while the rest is chiefly *bituminous*, or soft coal. Anthracite is the result of the metamorphism of bituminous coal by which it has been compressed and hardened and its percentage of fixed carbon and its fuel value have been increased through the loss of part of its volatile hydrocarbons. Anthracite coal is produced mainly in the eastern part of the state of Pennsylvania, and is the common fuel in the densely settled northeastern part of the United States. In other parts of the

country bituminous coal is more commonly used. The United States exports about $2\frac{1}{2}$ per cent of its production of coal.

Manufacture of Coke.—Certain grades of bituminous coals are employed mainly for the manufacture of coke. In this process the coal is burned with a limited supply of air in coke ovens. The volatile hydrocarbons pass off, and the hard carbon that remains forms the coke. Practically nine tenths of the iron produced in the United States is now smelted with coke, in place of hard coal, which was formerly employed. In some coke-producing plants the by-products, ammonia and gas tar, are utilized. From the latter valuable aniline dyestuffs, naphtha, benzine, carbolic acid, and creosote are obtained.

Graphite is a form of pure carbon mainly used in the manufacture of lead pencils and of crucibles on account of its being able to stand high temperatures without fusion. The principal supply of mineral graphite comes from Ceylon and Austria-Hungary. Some, however, is mined in the United States.

Quite recently artificial graphite has been manufactured by a process consisting in subjecting carbon to a high temperature, obtained by means of electricity. Large quantities of artificial graphite are produced in the neighborhood of Niagara Falls, where electricity can be cheaply produced. This artificial product is rapidly driving the natural graphite out of the market.

Peat.—Peat is a mineral fuel, composed of the roots and débris of swamp vegetation, which in many localities fill old lake beds to a great depth, forming bogs. It is used only where a better fuel, such as wood or coal, is not plentiful. Large deposits are found in Ireland, Scotland, Canada, and the United States.

Petroleum.—Petroleum, frequently called coal oil or rock oil, is an extremely valuable substance, that was formed in the geologic past by the decomposition of vegetable or animal matter when protected from the action of the atmosphere by superincumbent rock strata. Coal oil is generally associated with natural gas and water containing large quantities of common salt in solution. The oil and water collect in permeable strata, like the water of springs, especially within porous sandstone, and separate into

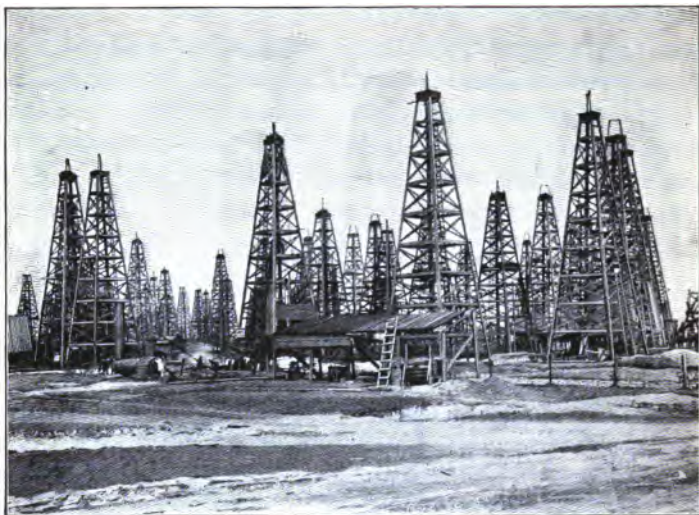


FIG. 60.—Oil Wells, United States.

layers according to their specific gravity. The gas collects in the upper layer, the water in the lower layer, and the oil between them. Petroleum is obtained by boring wells similar to artesian wells. In some cases, the oil and water are thrown up to a great height by the pressure of the gas. Such wells are called "gushers." In most cases the oil has to be pumped.

Petroleum-producing Countries of the World.—The United States produces about 50 per cent of the world's supply of petroleum, and Russia a little less. Smaller quantities are obtained in Austria-Hungary, Roumania, India, Japan, Canada, Germany, Burma, Sumatra, and other countries.

Some of the Uses of Petroleum.—Although crude oil is sometimes burned under boilers for the production of steam, yet the greater part of the product is refined into *kerosene* oil and used as an illuminant. But many other valuable products and by-products are obtained in the refining of petroleum.

Refining of Petroleum.—Petroleum is refined by subjecting the oil to distillation, by means of which the lighter and more

volatile products pass off as vapor, and are condensed by cooling. The lighter liquids, *cymogene* and *rhigolene*, are much employed in the arts as solvents for rubber, etc. The heavier products are *benzine* (now produced chiefly from coal tar), *gasoline*, and *kerosene*. The still heavier products form *lubricating oils*. In addition to the above, a great variety of solid products occur, from which *vaseline* and *paraffin* are obtained.

Petroleum and its products constitute important articles of commerce. Nearly all the Russian petroleum is exported to western and central Europe. The oil produced in the United States is more valuable than that produced in Russia, a large quantity of refined American oil being exported to Russia. Nearly 40 per cent of the United States product is exported. Of this about 10 per cent goes to Great Britain, 10 per cent to the rest of Europe, and the remainder to other countries.

Natural Gas. — Practically all the oil fields produce natural gas in great quantities, since this material collects with the oil, in sandstone and limestone strata, between beds of shale or some other impervious rock. Natural gas is generally consumed in the neighborhood of the wells, being conducted to its points of consumption by underground piping. Although some of the gas is used for illumination, yet the greater part is employed for supplying heat to factories in the neighborhood, such as glass factories, brick kilns, potteries, etc.

Asphaltum or Mineral Pitch is found in certain parts of the world, one of the most important sources being the famous pitch lake of the island of Trinidad. This material is valuable for manufacturing the asphalt used in paving.

Sulphur. — Sulphur occurs in a native or pure state in volcanic districts. It is obtained also by the action of heat on sulphides of the metals. Sulphur is largely used in the manufacture of sulphuric acid.

Clay Products. — In the United States the value of these products, according to the Census Report for 1900, formed 3 per cent of the total value of the non-metallic products. *Kaolin*

differs from clay mainly in the fact that it contains a very much smaller quantity of iron. Clay is employed in the manufacture of *bricks, sewer drain pipes, electric underground conduits, stoneware, earthenware, and crockery* generally. Kaolin is employed in the manufacture of *chinaware* and *porcelain*, and also for the manufacture of the *insulators* employed in the electric arts. It is employed also in the manufacture of *paper*, both for the purpose of increasing its weight and for imparting a surface so as to permit it to take ink readily in printing.

The United States produces large quantities of porcelain and earthenware in Trenton, New Jersey, and East Liverpool, Ohio. England, Germany, France, Holland, and Italy, as well as China and Japan, are all noted for the manufacture and export of porcelain and other fine manufactures of clay.

Glass is a compound of sand with an alkali or some metallic oxide. The ingredients are melted and caused to combine by



FIG. 61. — Interior of Glass Works.

the application of prolonged heat. The glass may be colored by adding to the mixture other appropriate mineral substances. While in a molten state, glass may be molded or blown into any

desired shape. Glass articles are sometimes ground and polished in a variety of beautiful patterns. These are called cut-glass goods and command high prices. As a rule, glass possesses the property of resisting the action of most acids and is a poor conductor of both heat and electricity. Glass is employed for a great variety of purposes, such as lights for windows, doors, roofs, globes for oil and glass lamps, bulbs and globes for incandescent and arc lamps, tumblers, bottles, jars, tubing, etc.

In the manufacture of window glass the glass is first blown into the shape of a long cylinder which while in a plastic condition is opened by cutting the glass lengthwise and then rolling the cylinder into a flat sheet. Such glass is called *sheet or cylinder glass*. *Plate glass* is made by pouring melted glass over the top of a table furnished with vertical edges, and afterward flattening it by passing a metallic roller over it while yet in a plastic state.

The principal glass-producing countries of the world, in the order of importance, are the United States, France, Austria-Hungary, Great Britain, Belgium, and Russia. More plate glass is made in Belgium than in any other country except the United States.

Mineral Waters.—Both because of their medicinal properties, and because the water supply of many cities is becoming unfit for drinking purposes, the value of various spring waters is gradually increasing. During 1900 the value of this product in the United States was more than \$7,500,000. The mineral waters of many springs of central Europe are bottled when they become articles of commerce.

Mineral Fertilizers.—*Nitrate of soda*, or *Chile saltpeter*, found in beds in the Desert of Atacama, in Chile, is mined and exported in large quantities for use both as a fertilizer and in the manufacture of explosives.

Phosphate of lime is mined abundantly in South Carolina and less so in Belgium, in the form of apatite in Canada, Norway, and England, and in the form of phosphorite in Spain. Basic slag, or the refuse in certain processes of steel making, also

yields a considerable proportion of phosphate of lime, and when ground is of commercial value as a fertilizer.

Guano, the droppings of aquatic birds accumulated in beds through long ages on rainless coasts, is worked as a mineral deposit, though properly of animal origin. It is now obtained chiefly from the coast of Chile, and in smaller quantities from the West Indies, the islands of the Pacific, and from islands off the west coast of Cape Colony.

Salt is obtained from the evaporation of sea water, from the waters of salt lakes or brine springs, or is mined in the form of rock salt. One of the most noted salt mines of the world occurs at Wieliczka, near Cracow, in Austria-Hungary. Although these mines have been worked since the beginning of the twelfth century, they still contain enormous deposits of salt.

In tropical countries salt is obtained from ocean water by natural evaporation. During high tide the ocean water is admitted to an extended area, so as to cover it with shallow water. Communication is then shut off, the water permitted to evaporate, and the deposited salt is scraped from the rocks.

The impure salt thus obtained is refined by dissolving it in water, evaporating the water by artificial heat, and then permitting the salt to recrystallize. In some districts, where beds of rock salt occur between impervious strata, instead of mining the salt in the solid form, wells are bored into the solid deposit, and a stream of water is forced down into it. After this water has taken up as much salt as it is capable of dissolving, it is pumped out of the wells and the salt is extracted by evaporation.

Salt is one of the necessities of life. In some countries heavy duties have been placed on salt, in order to increase the revenues of the government. In other countries salt is a government monopoly. Much salt is used in the curing of fish, in the salting and packing of meats, in dairying, and for live stock.

The United States produces more salt than any other nation, or nearly 25 per cent of the world's product. Great Britain produces about 17 per cent. Germany and Russia each pro-

duces 12 per cent, and France and India each about 10 per cent. Japan, Italy, and Spain rank next in the quantities produced.

Limestone for Iron Flux.—In countries where large quantities of iron are produced, great quantities of limestone are used for the flux in the blast furnaces. In 1901 this was valued, in the United States alone, at $4\frac{3}{4}$ millions of dollars.

Grindstones and Other Abrasives.—Various forms of grit sandstones are employed for abrasives. Ohio and Michigan produce the greater number of such stones. The finer-grained stones called *whetstones* are used for sharpening fine tools. The finest of all, used for oilstones, are obtained from Arkansas and Turkey. *Buhrstones*, formerly used in flour mills, have been generally displaced by steel rollers. *Corundum* and *emery* are oxides of aluminium employed for cutting and polishing. They are made into artificial stone, and employed in the shape of wheels in lathes for grinding. *Carborundum* is an artificial compound obtained by exposing a mixture of sand and carbon to the high temperature of an electric furnace.

Lithographic Stone is a very fine-grained *limestone* found in Bavaria. This material is employed in lithography to receive the design to be printed.

Mica is a well-known material occurring in the form of transparent sheets that are employed for lamp chimneys, stove fronts, and insulating material in electric apparatus. The principal mica-producing countries are Canada and India.

Asbestos is a fibrous mineral that is capable of being woven into rough cloth. It is practically incombustible, and is able to withstand high temperatures without being destroyed. Asbestos is used as a covering for boilers, steam and hot-water pipes, etc. It is used also in the manufacture of various fireproof paints. The principal country of supply is Canada.

Building Stones and Material.—The principal building stones are *granite*, *sandstones*, and *limestones*, all of which vary in color and texture; various *gneisses* and *schists*, employed for flagging; *slates*, used for roofing, for mantelpieces and table tops;

and *marbles*, capable of taking a high polish, and used either for inside or outside work.

Some of the most important building materials of mineral origin are as follows :—

(1) *Lime*, obtained by calcining limestone in lime kilns, the heat driving off the carbonic acid from the limestone, and leaving oxide of lime or quicklime.

(2) *Mortars*, which consist of various mixtures of sand and lime.

(3) *Cements*, which differ from mortars in that the lime has been obtained from the burning of limestones containing clay and silica. This gives to the mortar the ability to set or harden under water. Such mortars are called *hydraulic mortars* or *cements*.

(4) *Sands* and *gravels*, which are employed in the preparation of mortar and cements.

(5) *Gypsum*, or sulphate of lime, which, when calcined, forms plaster of Paris, a material employed for the finish of the walls and ceilings of rooms.

Gems and Precious Stones occur in such small quantities, and possess such high value for ornamental purposes, that they are greatly prized. Some of the principal of these are as follows :—

(1) *Diamonds*, a crystallized variety of pure carbon found in South Africa, Brazil, India, New South Wales, and the Ural Mountains.

(2) *Emeralds*. These are gems of a beautiful green color and are very highly prized. Fine varieties come from Colombia and New South Wales.

(3) *Sapphires* are beautiful blue gems that come from Brazil, India, Siam, etc. They occur also in the United States.

(4) *Rubies* are of a deep red color. They are found in Siam and India. When pure they are more valuable than diamonds.

(5) *Opals* are beautiful gems of changing hues, which, when fine, are highly prized. Splendid specimens come from Australia.

(6) *Turquoises* are found in New Mexico, Arizona, Nevada, California, India, and elsewhere. Among other gems may be mentioned the *garnet*, *lapis lazuli*, *onyx*, *jasper*, *agate*, *carnelian*, and *bloodstone*.

III. COMMERCIAL COUNTRIES

CHAPTER XII

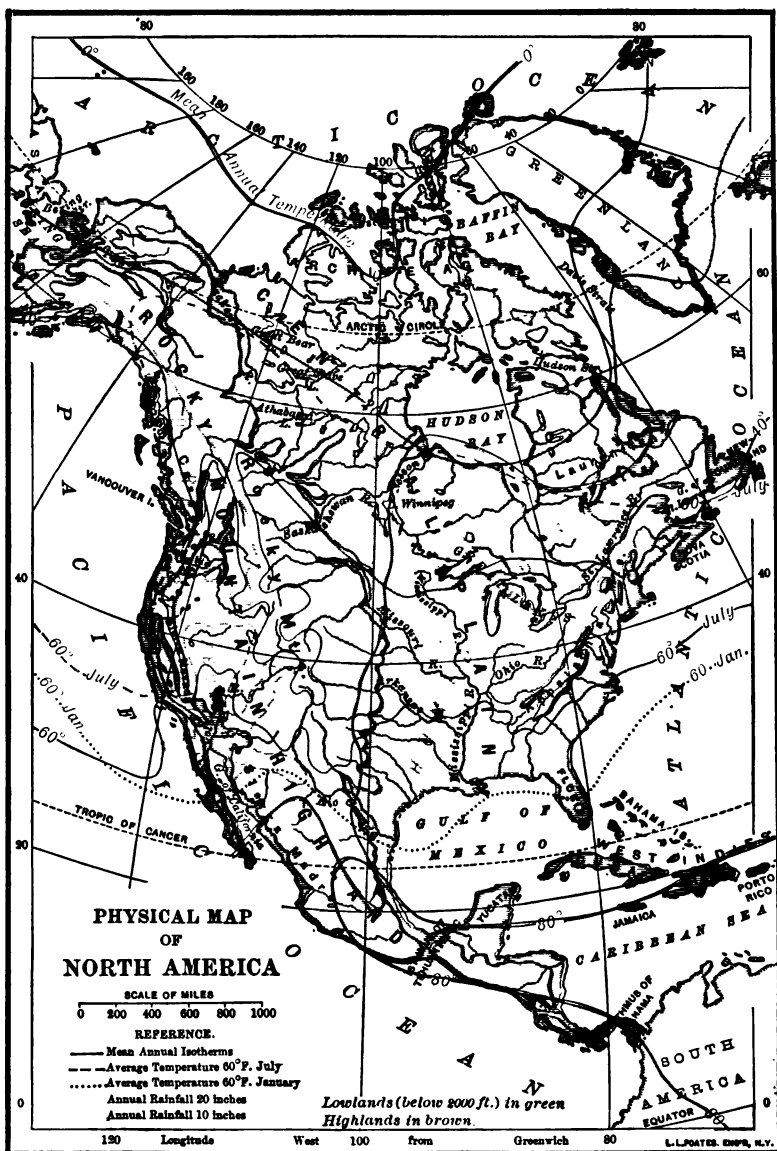
NORTH AMERICA. UNITED STATES

NORTH AMERICA — PHYSICAL CHARACTERISTICS

Area, 9,430,000 square miles. Population, 105,806,000. Density, 11

Surface Structure. — The surface structure of North America is exceedingly simple. In the west a broad highland rises from the Pacific and stretches along the coast from the Arctic Ocean to the Isthmus of Tehuantepec, while in the east is a much lower, narrower, and less continuous highland. The interior slopes of the eastern and western highlands form a great central plain which composes most of the remainder of the grand division. The central plain is a region of moderate elevation and relief, which is separated into a southern half drained chiefly by the Mississippi and its tributaries, and a northern half drained chiefly by the Mackenzie and the Saskatchewan-Nelson. A portion of it also drains eastward to the Atlantic Ocean through the St. Lawrence River. A large part of the western highland is a great plateau bordered by the Cascade Range and the Sierra Nevada near the Pacific coast, and traversed by the Rocky Mountains on the east. Considerable areas of this intermontane region form interior drainage basins, that is, their drainage does not reach the sea. The eastern highland includes the Appalachian Mountains and the Laurentian Plateau. In Fig. 62 the green represents lowlands (under 2000 feet elevation) and the brown highlands.

Climate. — In general, the northern part of North America has long, cold winters and short, temperate summers, the July isotherm of 60° F. lying in the neighborhood of the Arctic Circle



(164)

FIG. 62.

in the Mackenzie Valley. In the central parts the winters are cold and the summers hot. In the eastern, southern, and southwestern parts the summers are long and hot and the winters are temperate, the January isotherm of 60° F. lying in the latitude of Florida. Lying in the zone of prevailing westerly winds, most of the western coast of North America has a climate devoid of extremes of temperature.

The mountain chains near the Pacific coast, lying across the course of the prevailing winds, receive, except at the south, a heavy winter rainfall on their western slopes. The plateau to the eastward of these chains is thus deprived of moisture and is an arid region, receiving in general less than 20 inches of rain during the year, and in some places scarcely any. East of the one hundredth meridian, however, and south of Hudson Bay, the cyclonic winds bring moisture from the Gulf of Mexico and the Atlantic and deposit an annual rainfall of from 20 to 60 inches. This rainfall is well distributed through the year, but is somewhat greater in summer than in winter. In the extreme south, the northeastern trades bring copious rains to the eastern slopes during the winter.

Resources and Industries. — The distribution of characteristic resources and industries in North America is determined in marked degree by the distribution of climate and relief.

The region north of the July isotherm of 60° F. and east of the Rocky Mountains is in general too cold for agriculture, is but sparsely inhabited, and contributes little except furs to the world's commerce.

The broad arid region extending south from this isotherm along the western highland, although it contains some open forests in the north and on the mountain slopes, is generally nearly treeless and usually too dry for successful farming without irrigation. But it furnishes a natural pasturage for sheep and cattle and its broken surface renders accessible great mineral wealth — chiefly gold, silver, copper, and lead — hence herding, and mining for these metals are the chief industries of the rather sparse population.

The large humid region of the east is mostly lowland. North of the great lakes it is chiefly forest-covered, and there are other great forest areas along the Appalachian highland and southward to Central America. Elsewhere the region is largely devoted to agriculture, and furnishes a notable proportion of the world's product of grain, meat, cotton, tobacco, and sugar cane. One of the richest coal fields of the world outcrops along the edges of the Appalachian plateau. Iron ore also is found in the Appalachian region and in still greater quantities in the vicinity of Lake Superior. It is therefore not surprising that this favored region is the home of the bulk of the population in America, and that it is characterized by a great variety of agricultural, manufacturing, and commercial industries.

The smaller humid region of the Pacific coast is largely covered with dense and valuable forests, and lumbering is a leading industry in many sections; but in many of the valleys large crops of grain and fruits, particularly grapes, are produced, and the industries of agriculture and herding are important.

UNITED STATES — PHYSICAL CHARACTERISTICS

Area exclusive of Alaska and insular possessions, 3,090,777 square miles.

Population (1900) 76,000,000, or about 25 to the square mile

Surface Features. — The United States occupies the central part of North America, stretching from the Atlantic to the Pacific. The chief topographical features are the Appalachian Mountains in the east, the broad Pacific highland in the west, and the great central plain between these highlands. East of the Appalachian Mountains the Atlantic coast plain is very narrow in the north, but it attains a width of over 200 miles in Georgia, where it merges with the southern part of the central plain.

The **Appalachian Mountain System** extends from Maine to Georgia, approximately parallel to the Atlantic coast, with a breadth varying from 150 to 200 miles. South of the Hudson River this

mountain system consists of a broad plateau about 2000 feet high, bordered on the east by a number of nearly parallel mountain ridges, separated by broad, fertile valleys. The western or plateau portion, called the *Allegheny Plateau*, decreases in height toward the west, and merges with the central plain. In the north the larger streams flow southeast and discharge their waters into the Atlantic, crossing the mountain ranges through water gaps. In the south the streams flow northwest to the Ohio River, both the Kanawha and the Tennessee cutting deep gorges through the plateau. These gorges and water gaps form natural transportation routes across the mountains.

The Pacific Highland covers about one third of the entire area of the United States, and consists of a broad plateau from one to two miles high, surmounted by two high and rugged mountain systems: the Rocky Mountains and the Pacific mountains.

The Rocky Mountains consist of many parallel ranges, some long and continuous, others short, and nearly all trending about north and south. The continental divide between the Atlantic and the Pacific drainage lies in these mountains in the northern half of the United States.

The Yellowstone National Park, in the northwestern part of Wyoming, is a region characterized by hot springs, big geysers, and splendid mountain scenery. So magnificent and wonderful are these natural features that this district has been set aside by the national government as a public park.

The Pacific mountains extend through Washington, Oregon, and California parallel to the Pacific coast, and include the Cascade Range in Oregon and Washington, and the Sierra Nevada in California, as well as the lower Coast Ranges which border the coast.

Between the Coast Ranges and the higher Sierra Nevada and Cascade ranges lie a series of broad and fertile lowland valleys, — the Puget Sound valley in Washington, the Willamette valley in Oregon, and the Sacramento-San Joaquin valley in California. The drainage of these valleys finds its way into the Pacific through three important gaps in the Coast Ranges, occu-

pied respectively by the Strait of Juan de Fuca, the Columbia River, and the Golden Gate of San Francisco Bay.

The Great Central Plain slopes imperceptibly from the Appalachian and the Rocky Mountain systems toward the Mississippi River. This region is divided into three distinct parts, viz. :—

(1) *The Lake plains* on the north, a region covered with glacial drift, and containing numerous lakes of glacial origin.

(2) *The Prairie plains*, a nearly treeless region also covered with drift, in which, however, most of the old lake basins have been filled with sediment.

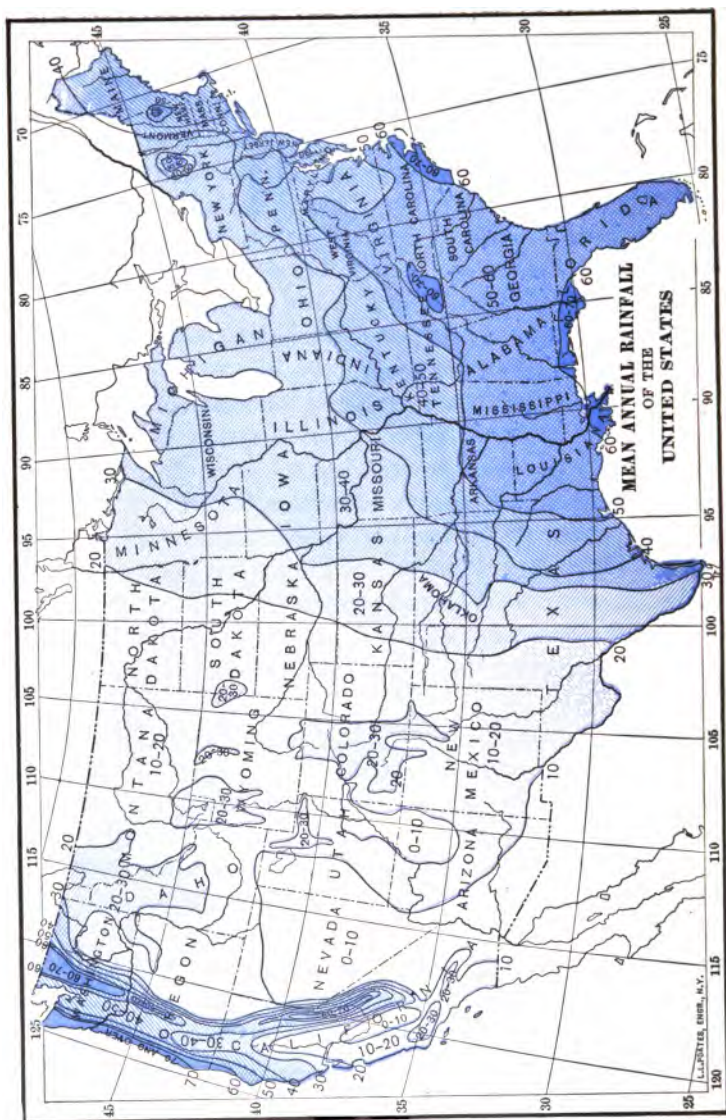
(3) *The Gulf plains*, occupying the central plain south of the Ohio River.

In some parts of the Gulf plains, the flood plains of the Mississippi are 70 miles in width. This portion of the plain is exceedingly fertile, and contains many farms and plantations. Levees, or river embankments, have been built to keep the river from overflowing the cultivated land. Breaks in the levees that sometimes occur cause the country to be flooded for many miles, occasioning great loss of property.

The Ozark Mountains, a system of plateaus and low mountains, occupy a part of the Central Plain between the Missouri and the Red rivers.

The Atlantic Coast Plain.—South of the Hudson River the Atlantic and Gulf coasts are bordered by low, sandy islands or barrier beaches inclosing narrow lagoons of salt water. The coast plain proper can be divided into (1) *the Tidewater region*, which is low, flat, sandy, and often marshy, and through which the streams flow very sluggishly, and (2) *the Piedmont region*, of low hills and open valleys, which lies west of the Tidewater region and rises gradually to the Appalachians. The line where the Tidewater region joins the Piedmont region is called the Fall line, because most of the streams cross it in a series of falls or rapids. As already mentioned, manufacturing cities and towns have been founded at such points.

Temperature.—The isothermal lines of mean annual temperature will be found in Fig. 63, p. 166, and a general idea of the



(170)

FIG. 64.

seasonal changes of temperature can be gathered from Fig. 65. The country may be divided into four climatic regions, viz. : —

(1) A region characterized by temperate summers and cold winters.

(2) A region characterized by hot summers and cold winters.

(3) A region characterized by hot summers and temperate winters.

(4) A region that is always temperate.

In the eastern and northeastern parts of the country, especially, the weather is subject to great and sudden changes of temperature, caused by cyclonic storms that

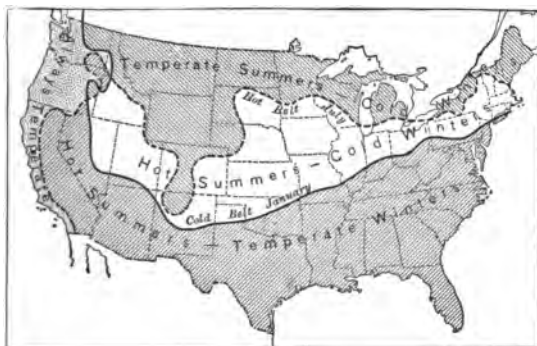


FIG. 65. — Seasonal Belts.

cross the country from west to east. The United States Weather Bureau is able, by carefully studying the movements of these storms, to give timely warning of coming changes of weather, and thus greatly aid agriculture and commerce.

Rainfall. — The United States lies mainly in the region of the prevailing westerly winds. The distribution of the rainfall is shown in Fig. 64. The heaviest rainfall occurs on the northern Pacific coast, on the Gulf coast, and on the Atlantic coast. The rainfall over the greater part of the western highland east of the high Pacific ranges is too small for agriculture, without irrigation. The eastern half of the United States is well watered from the Gulf of Mexico and the Atlantic. In this part of the country the rainfall decreases gradually from south to north, and is slightly greater in summer than in winter. It is generally ample for agriculture.

The extreme southwestern coast is dry. Precipitation increases toward the north, however, and most of the western coast

has an abundant rainfall, caused by ocean winds from the west and southwest; but the mountain ranges near the coast prevent this rainfall from extending farther inland than a few hundred miles. The rains occur mainly during the winter, the summers being dry. The same peculiarity of rainfall distribution characterizes most of the corresponding regions in British Columbia and southeastern Alaska.

Nearly all the western plateau region of North America, from the Arctic to Mexico, has a scanty rainfall and is devoid of forests except on the mountains where the precipitation is greater. In the southwest there are areas of true deserts where months and even years pass without a drop of rain. On the Great Plains some years have a sufficient rainfall for crops of grain, but other years are too dry, and therefore agriculture over this whole region is precarious without the aid of irrigation.



FIG. 66. — Cornfield, United States.

Soil. — Most of the northern parts of the United States are covered with glacial drift. The region extends farthest to the south in the Valley of the Mississippi, and includes, approxi-

mately, all the region north of the Ohio and Missouri rivers, as well as New England, New York, and parts of Pennsylvania, New Jersey, and of the northwest Pacific States. It is in the exceedingly fertile flood plains of the Ohio and Missouri basins that our great crops of corn are chiefly produced.

In most of New England the drift contains so many boulders as to render agriculture very difficult. In many of the larger valleys, however, such as that of the Connecticut, the flood plains are wide and have a very fertile soil.

In the Gulf plains, where transported soil is found, it is generally fertile, but here as also in the Pacific valleys, where in many places the soil has been formed in place, the fertility varies according to the nature of the underlying rock. As a rule, however, in the western districts, wherever irrigation is practiced, the soils are found to be extremely fertile, since they have been lying fallow for probably hundreds of thousands of years, and have not lost their rich fertilizing materials.

CHAPTER XIII

UNITED STATES — VEGETABLE PRODUCTS

Agriculture. — Excluding Alaska and the insular possessions, a little more than one sixth of the total area of the United States is under cultivation, and a little more than two sixths is woodland.

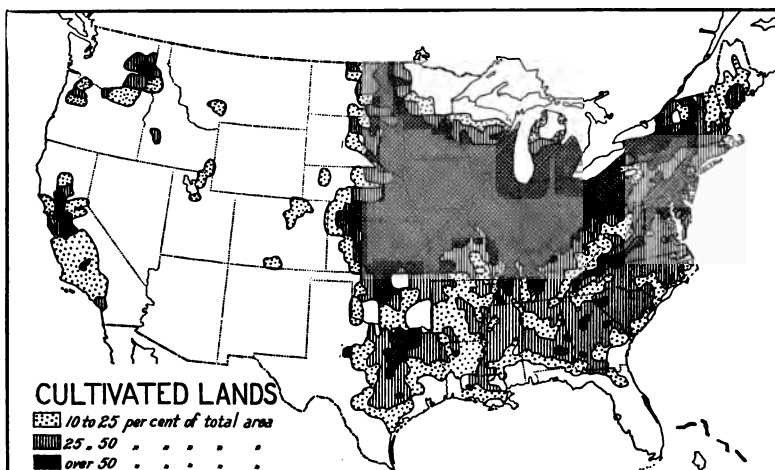


FIG. 67.

Of the remainder, which is situated mainly in the western part of the country, a part is used for pasturage, while the rest is unfit for cultivation, either by reason of the scanty rainfall, or because of the rugged character of its surface. Figure 67 shows the proportion of cultivated lands. As will be seen, more than half of the area is under cultivation in New York, Ohio, Indiana,

Illinois, and Iowa; while in most of the Eastern and Central States more than one fourth of the area is cultivated.

Farms.— There are about 5,750,000 separate farms in the United States. These yield not less than one sixth of the world's total agricultural products, and make the United States the first farming country of the world.

There is considerable difference in the size of the farms in different parts of the country. Very generally in the Pacific States, and in the Dakotas, Nebraska, Kansas, and Texas, where land is cheap and labor dear, cultivation is carried on by the use of machinery, so that there large farms are the rule, while in the densely settled states, where land is relatively dear, intensive cultivation by hand is found more economical, and small farms prevail.

Vegetable Products of Different Sections.— The valleys of the Mississippi, Ohio, and Missouri rivers and the Gulf plains form the great agricultural section of the country. In the northern part of this region lies the greatest wheat and corn producing district in the world. The central part of the region, extending from Ohio to Nebraska, is noted for the production of corn, cattle, and hogs. There also are found the principal meat-packing centers of the country. In the Gulf plain is the most important cotton-raising region in the world. In the extreme south, in Louisiana, sugar is raised.

A large part of the Atlantic coast plain is also devoted to agricultural purposes.

The Great Plains, extending through the entire country, from Canada to Mexico, are covered with natural grasses, and the raising of cattle and sheep forms the chief industry, although some agriculture is carried on with the aid of irrigation.

Corn is the Most Valuable Crop, averaging over 2 billion bushels, and forming 75 per cent of the world's supply. The principal corn region is shown in the map in Fig. 68, and the percentage of the total crop usually raised in the states of largest production is shown in the diagram.

Less than one tenth of the corn crop is usually exported in the form of corn. The greater proportion is employed in feeding live stock, especially hogs and cattle. A large part of the corn

crop is thus exported in the form of meat. Some of the corn crop is distilled into whisky.

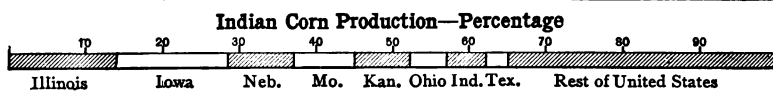
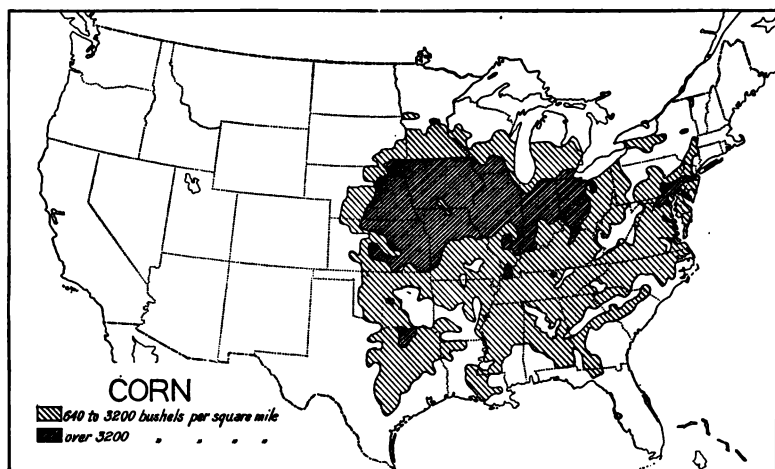


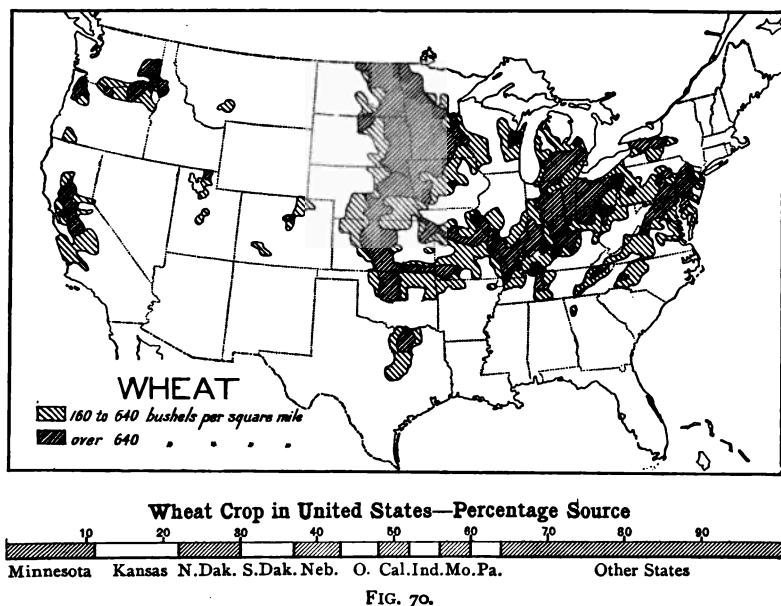
FIG. 68.

Wheat.—The United States produces generally about 20 to 25 per cent of the total wheat crop of the world. The location



FIG. 69. — Thrashing Wheat in the United States.

of the principal wheat-producing regions and the percentage of yield in the most important states are shown in Fig. 70. But the wheat crop of many of the other states is largely in excess



of the local demand and is sent out of the state for consumption. Minneapolis, in the heart of the wheat region, is the great flour-manufacturing city of the world.

The wheat crop of the United States is cultivated, harvested, and handled almost entirely by machinery. At the farm, power plows, seeders, harvesters, and thrashers are used. When the wheat reaches the huge storehouses, where it is kept ready for shipping, it is removed from the wagons, raised, cleansed, and emptied into the receiving bins, and, at later stages, transferred to the various transportation routes entirely by mechanical means.

About one fourth of the crop is exported, nearly half of it going to Great Britain.

Oats.—The annual crop of this cereal in the United States varies from 700,000,000 to 1 billion bushels. A small part

only of the crop is used as food for man, the greater part being fed to horses and mules. Figure 71 shows the principal regions in which oats are cultivated and the relative production of the different states.

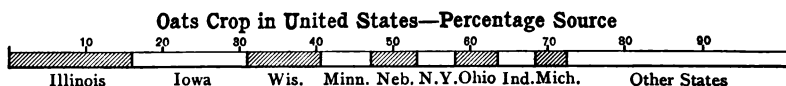
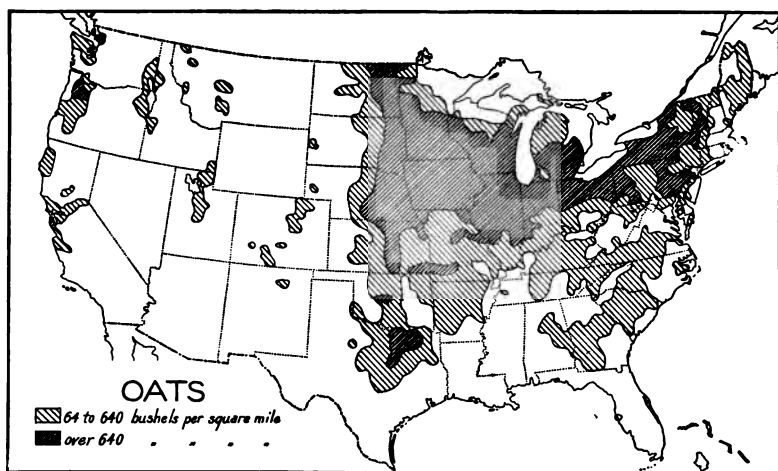


FIG. 71.

Of the other cereals, *barley*, *rye*, and *buckwheat* are cultivated mainly in the northern part of the country, and are comparatively unimportant.

Hay forms one of the most valuable crops in the United States. Its average annual value is \$470,000,000, coming next in value to the corn crop. It is of great importance in the cattle-raising states of the corn districts, and in the dairy states of New York, Iowa, and Pennsylvania. The greater part is fed to cattle.

Sugar.—Nearly all the cane sugar produced in the United States is raised in Louisiana and Texas. Beet sugar is produced in California, Nebraska, Utah, and Michigan; a little maple sugar in Vermont, Pennsylvania, and Ohio; and a little

sorghum, used in the manufacture of molasses, is grown in Kansas. The United States is the greatest sugar-consuming country in the world — every person in the country using on the average 70 pounds per year. Not only does it consume all its

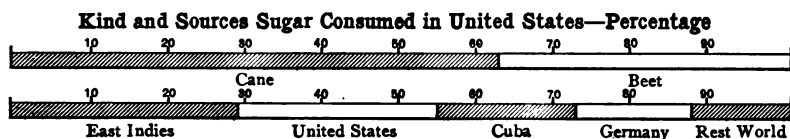


FIG. 72.

own product, but it imports large quantities from other parts of the world. The principal sources for this additional amount are shown in Fig. 72.

Rice is raised in the United States in the low coastal plains of Texas, Louisiana, and South Carolina. This country produces about one half of the rice it uses, importing the remainder from other countries.

Tobacco. — The United States produces more than 37 per cent of the tobacco crop of the whole world. Tobacco is grown in various parts of the country from Wisconsin to Louisiana, as



FIG. 73.—Interior of Tobacco Warehouse.

will be seen from an examination of Fig. 74. The principal producing states, in the order of their production, are shown in the diagram. Kentucky is by far the largest producer.

About one half of the total tobacco crop of this country is exported, much going to Great Britain.

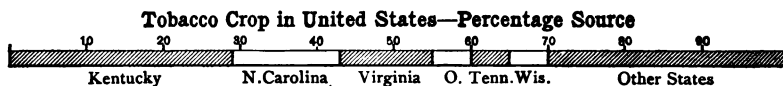
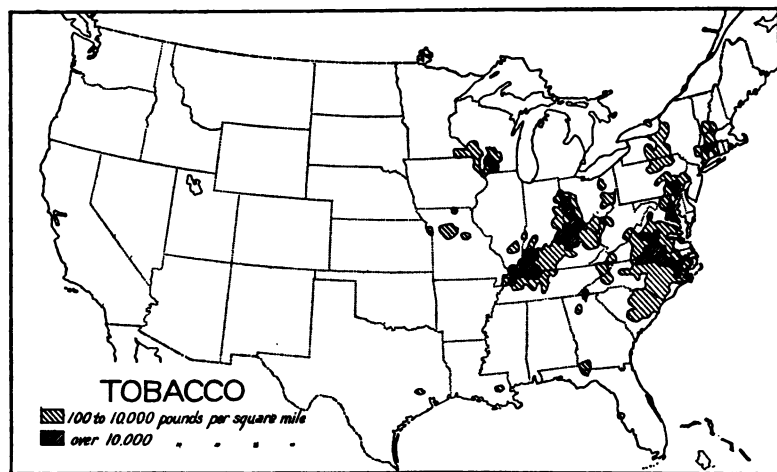


FIG. 74.

Cotton.—Between 1895 and 1900 the United States produced three fourths of the world's supply of cotton. Although the cotton crop is exceeded in value by several other agricultural products, yet it is of great importance as an article of commerce. The crop now reaches about 10,000,000 or more bales, having more than doubled since 1870. From an inspection of Fig. 75 it will be seen that the cotton section includes all the southeastern states from North Carolina to Texas. In almost all of these states the cotton crop is of prime importance.

The production of the different states and the disposition of the cotton crop are shown in the diagrams.

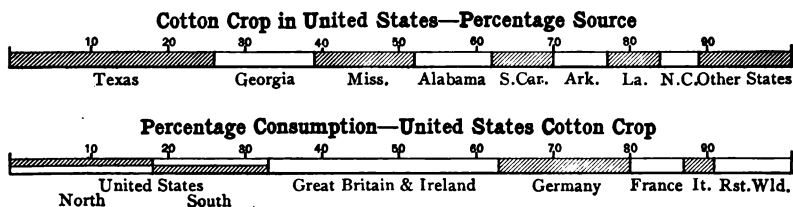
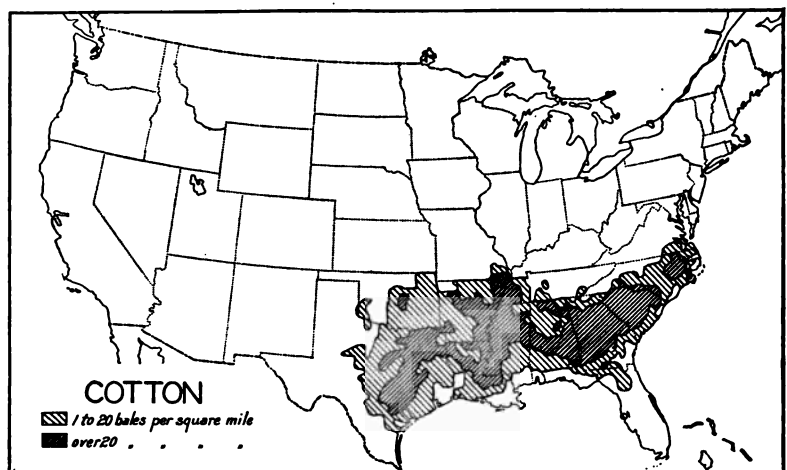


FIG. 75.

Flax.—Flax is grown in the United States chiefly in the Dakotas and Minnesota. It is raised here mainly for its seed, this country importing all of its linen fiber from Europe.

Fruits.—Although much fruit is raised on the farms, such as apples, pears, peaches, plums, apricots, cherries, etc., the larger part was until recently either consumed at home or disposed of in the immediate neighborhood. There is, however, on account of improvements in fast freight trains and cold storage, a very considerable and rapidly growing commerce, both domestic and foreign, in some of the fruits raised in the country. This is

especially true of the apples raised in the northeastern section, and of the grapes, pears, pineapples, oranges, and apricots of California.

Strawberries form one of the most important articles of domestic commerce. Peaches are raised in large quantities in Delaware, Maryland, and New York; and oranges, lemons, and pineapples in Florida. Grapes form a valuable crop in New York. Olives are raised in California.

Fresh Vegetables.—Although too bulky as a general thing for export, yet the domestic commerce in fresh vegetables by fast freight from Florida and the Southern States to the northern market during the winter months is rapidly increasing. Early potatoes and onions are shipped to the United States from the Bermudas.

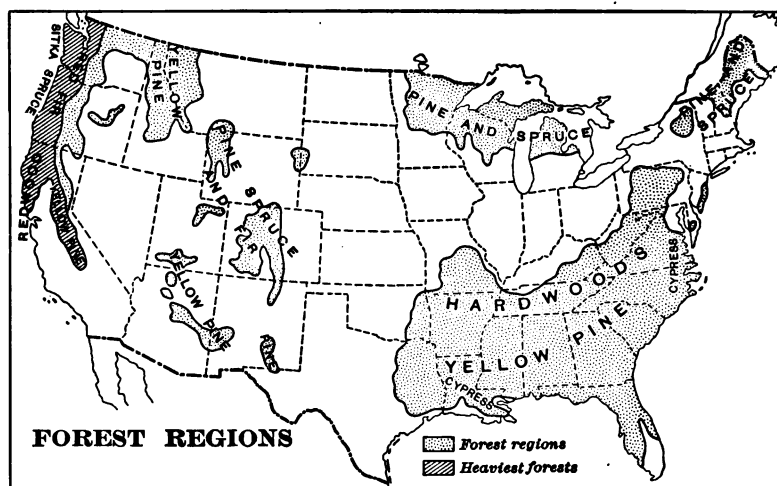


FIG. 76.

Forests.—The forest area of the United States, exclusive of Alaska, is about 500 million acres. A rough estimate of the quantity of timber standing and ready for the ax is 2360 billion feet board measure. The total annual cut is estimated at 25 billion feet, three fourths being conifers, and the remainder oak and other hard woods.

The forest reserves lie in fourteen states and territories, and have a total area of 56,000,000 acres.

The regions producing lumber shown in Fig. 76 may be divided as follows:—

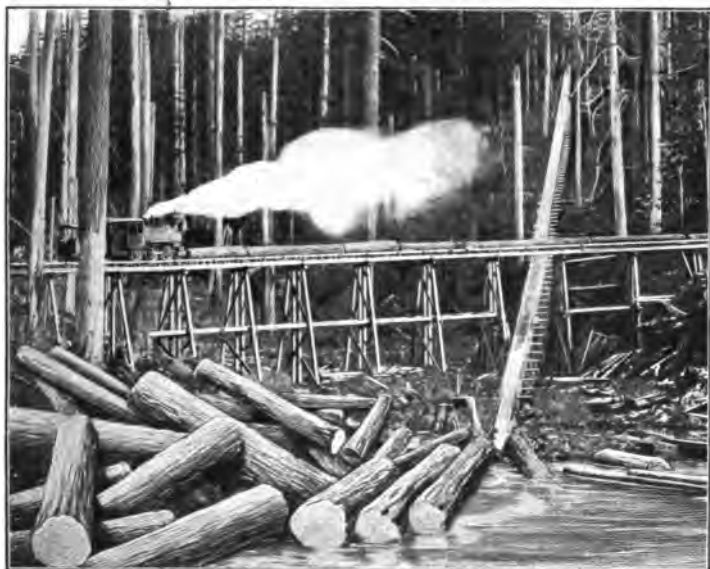


FIG. 77.—Lumbering.

(1) The *Lake Region*, including the states of Michigan, Wisconsin, and Minnesota. This region is characterized by the white pine and spruce.

(2) The *Southern Region*, characterized by hard woods in the north, by yellow pine in the south, and by cypress in the lower Mississippi Valley and in the tidewater region of North Carolina and Virginia.

(3) The *Northeast Region*, including New England and North Atlantic States, where the white pine, spruce, birch, maple, and hemlock of Maine, and the pine, hickory, and oak of the Middle Atlantic States, are characteristic.

(4) The *Rocky Mountain Region*, characterized by yellow pine and spruce.

(5) The *Pacific Region*, characterized by red fir and Sitka spruce in the north, and by yellow pine and redwood in California. This region includes the densest forests in the country.

The principal *hard woods* that become articles of commerce are cherry, poplar, cypress, chestnut, walnut, maple, oak, cottonwood, and hickory, and, to a much smaller extent, ash, birch, elm, and beech.

The principal *soft woods* of commerce are the pine, spruce, and hemlock.

The forests of Michigan, Wisconsin, and Minnesota have during recent years supplied most of the white pine, with Chicago as the principal distributing center. Spruce lumber is obtained chiefly from Maine, New Hampshire, and the Adirondack district of New York. Boston, Albany, and New York are the largest spruce lumber markets. This wood is chiefly reduced to pulp for paper making. Hemlock, the bark of which is employed for tanning, is found chiefly in southern New York and northern Pennsylvania.

CHAPTER XIV

UNITED STATES—ANIMAL PRODUCTS

Live Stock:—The United States leads the world in the production of all varieties of live stock except sheep. This is due to the fact that much of our enormous corn crop is fed to live stock, probably one third of it being fed every year to hogs.

Cattle.—Cattle are raised in the United States both for beef and for dairy products.

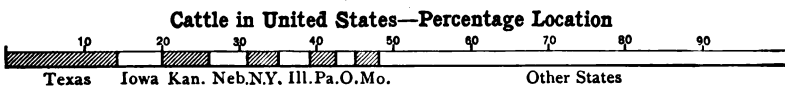
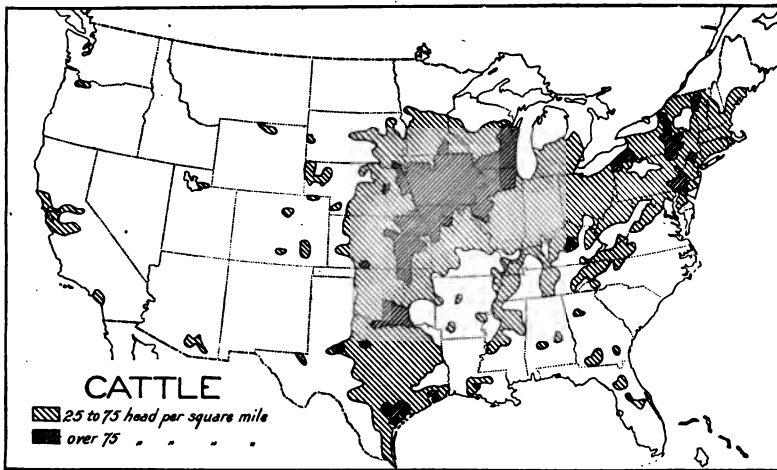


FIG. 78.

The raising of cattle for beef is carried on mainly in the north and west, although large numbers are raised in Texas, on large ranches or ranges.

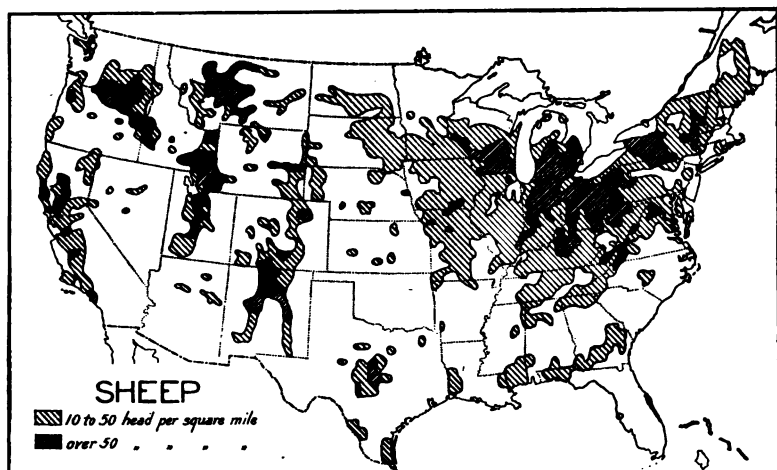
On cattle ranches the cattle of different owners are permitted to roam together over the feeding grounds. They are distinguished from one another only by brands, characteristic markings, or letters, that are burned into the skin. During the spring of each year the owners have what is called a 'round up,' during which all the cattle on the ranch are collected in corrals or inclosures. Here those bearing the different brands are separated from one another, and the young calves are branded like their mothers. Then, after such as are desirable for market have been selected, the remainder of the herd are again turned loose on the plains. In the southwest, cattle do not require any extra food, being able to live by grazing on the natural grasses. In the northwest, however, where the climate is more severe, it is sometimes necessary to provide shelter and food during the winter months.

Figure 78 shows the principal parts of the country in which cattle are raised, and the percentage in each of the principal cattle states of the total number in the country. Besides the beef cattle raised on the western ranges, vast numbers are raised in the eastern part of the country. Cattle from both sections are shipped alive to Europe, most of them going to Great Britain. The greater part, however, of the cattle raised on the ranges of the west are shipped to the extensive slaughtering and meat-packing establishments in Chicago, Kansas City, and South Omaha.

Sheep.—In the United States, sheep are raised more for their wool than for their meat, although much meat is refrigerated and shipped to different parts of the country. Wool growing is increasing in the Eastern and Central States. The distribution of sheep is shown in Fig. 79. Sheep are readily raised in the west, where they have, to a great extent, driven out cattle from the public ranges; but as sheep graze very closely, they are apt to ruin the pasturage where grasses are not very plentiful.

Wool.—The total amount of wool annually raised in the United States reaches about 300,000,000 pounds, an increase of nearly 50 per cent since 1870. Montana is the most important wool-producing state, and Ohio, although it is exceeded by several states in number of sheep, ranks second in the value of wool clip. The United States manufactures all of its wool product and nearly half as much more, chiefly wool from

Australia, Argentina, and China. It comes, however, by the way of London, which is the largest wool market in the world.



Sheep in United States—Percentage Location

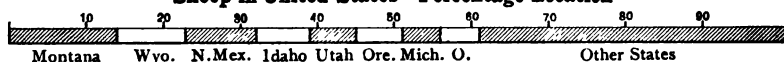


FIG. 79.

Boston is the principal wool market of the United States, and the principal center for the distribution of the raw product to the various mills in the New England States.

Horses.—Most of the horses raised in this country are sold in home markets or exported mainly to Great Britain and Germany. Mules are raised in considerable numbers in the west and south.

Many valuable products are obtained from the horse. The hides are made into leather; the hair is employed for the manufacture of haircloth, or is curled and employed by the upholsterers for stuffing mattresses, furniture, etc.; the bones are employed in the manufacture of fertilizers; and the hoofs and some other parts of the body are made into glue.

Poultry and Eggs.—Eggs constitute an important article of commerce, both as a food product and for use in photography and calico printing. The United States produces more than

10 billion eggs annually. Nearly all of these are consumed in this country, only about 10 per cent being exported. Practically all the poultry raised in the United States is consumed at home.

Hogs.—The United States leads the world in the production of hogs. Practically no live hogs are exported, the animals going to the great slaughterhouses, where the meat is packed or refrigerated for export.

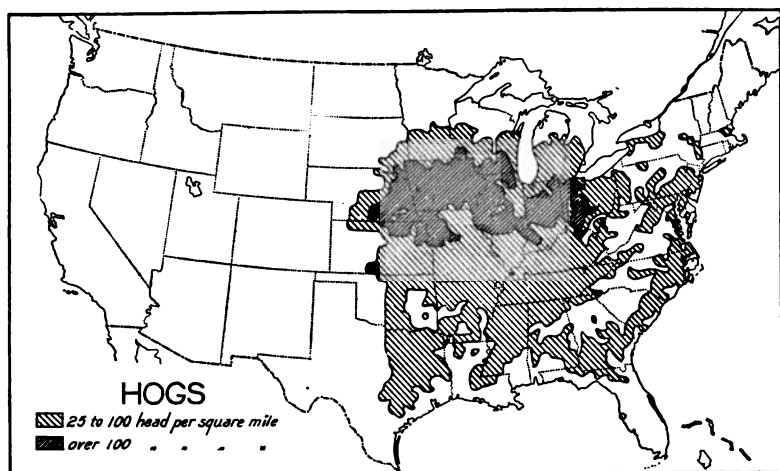


FIG. 81.

Fisheries of the United States.—The fisheries of the Atlantic coast of the United States are among the best in the world. The fishing grounds of the United States are shown in Fig. 80.

Gloucester, Massachusetts, is the most important fishing port in the United States, and has a large trade in salted fish. *Herring* occur along the Atlantic coast from Maine to Hatteras. *Shad* also are plentiful along this coast, and are caught chiefly in the rivers, which they enter from the ocean for the purpose of spawning. The most important of these are the Delaware, the Hudson, the Connecticut, the Kennebec, and the tributaries of the Chesapeake. *Bluefish* and *Spanish mackerel* are highly prized food fish of the eastern coast. *Menhaden* are caught in great numbers and employed for the manufacture of guano and fish oil. *Whitefish* are a valuable food fish found

in the Great Lakes. *Sturgeon*, whose roe is salted for caviar, also occur in the Great Lakes. *Salmon* occur in great numbers on the northwestern coast of the United States and in Alaska, where the catch is canned for market. Some are refrigerated for transportation to the eastern market. In order to maintain the supply of salmon on the northwestern coast, the rivers are being supplied with young fish raised in hatcheries, five of which have been established in Washington and three in Oregon.

The shallow estuaries and bays of the Atlantic coast, from Massachusetts to Virginia, produce the largest and best-flavored *oysters* in the world. The natural beds having been exhausted, a successful cultivation of the oyster has been carried on by planting. Such beds have been established both on the Atlantic and Pacific coasts. The United States yields about 87 per cent of the world's total product. Chesapeake Bay and Long Island Sound supply the best.

CHAPTER XV

UNITED STATES—MINERAL PRODUCTS

The Mineral Products of the United States have a value of nearly $1\frac{1}{2}$ billion dollars annually. This is about 10 per cent of the value of all the other industries in this country, and equals, approximately, the value of the mineral products of the rest of the world. The non-metallic have a slightly greater value than the metallic products. The product of coal and iron has a greater value than those of any other two minerals, and amounts to considerably more than half of the total value of mineral products.

METALLIC PRODUCTS

Metallic Products.—The metallic products of the United States, named in the order of their money value, are pig iron, copper, gold, silver, lead, zinc, aluminium, quicksilver, antimony, and nickel.

Iron.—The United States produces annually about 33 per cent of the iron product of the entire world, and about 50 per cent more than Great Britain, her principal competitor.

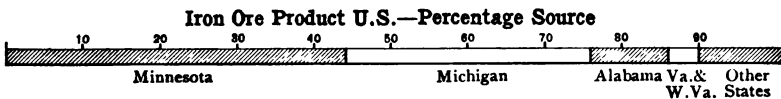


FIG. 82.

As we have already seen, iron ore is of very common occurrence. It is found in fairly large quantities in nearly one half of the states of the Union, but, as Fig. 82 shows, Minnesota, Michigan, and Alabama are by far the largest producers.

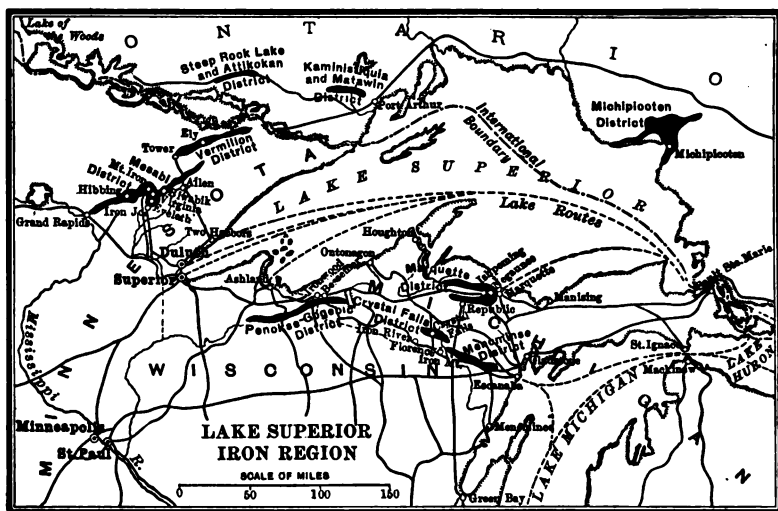


FIG. 83.

The Minnesota iron ranges are the Vermilion and the Mesabi. Those of Michigan are the Marquette, extending through Negaunee and Ishpeming, the Menominee, the Crystal Falls, and the Penokee-Gogebic districts. The last extends into Wisconsin. The location of this "Lake Superior iron ore district" is shown in Fig. 83. All these mines, especially the first two, are extremely valuable. In the Mesabi district the ore is mined by means of steam shovels, and loaded directly from the shovels on the cars, which carry it to Lake Superior for transportation to Pittsburg, Chicago, Detroit, Toledo, Cleveland, and elsewhere. Much of the ore is red hematite, free from sulphur and phosphorus, and, consequently, capable of making excellent pig iron suitable for the manufacture of Bessemer steel.



FIG. 84.

The principal ore ports on Lake Superior are Two Harbors and Duluth in Minnesota, and Marquette and Escanaba in Michigan.

The iron ore deposits of Alabama, although not so rich as those of the Lake Superior district, are very valuable, since they occur, as has already been mentioned, in connection with the deposits of coal and limestone required for smelting. (See Fig. 84.)

The New York iron ores are obtained from the Adirondacks and the highlands. These ores are magnetites of great richness and purity, and are shipped mostly to Pennsylvania for smelting.



FIG. 85. — Making Pig Iron.

About two thirds of the ores produced in Minnesota and Michigan are smelted in the neighborhood of Pittsburg, Pennsylvania. Nearly all the remainder goes to northern Ohio or Chicago. This indicates the enormous traffic in iron ore which is carried on through the Great Lakes.

Copper. — The United States produces more than 50 per cent of the world's total output of copper, which usually ranks next to iron in value among our metallic mineral products. (See Fig. 86.) The Anaconda mine in Montana is one of the most productive in the world. In Michigan the ore is native copper,

the metal occurring irregularly in seams, sheets, and masses. The principal mine in this district is the Calumet and Hecla, on

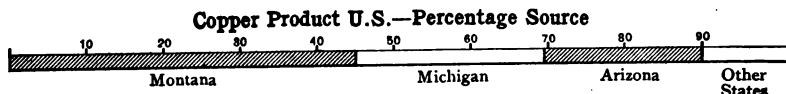


FIG. 86.

Keweenaw peninsula, and the ore is conglomerate rock, containing small particles of copper.

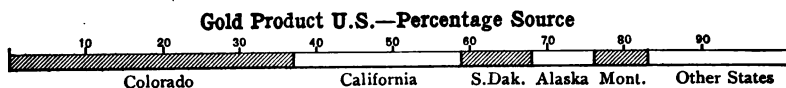


FIG. 87.

Gold. — The value of the gold produced in the United States is somewhat less than that of the copper. The United States is one of the great gold-producing countries in the world. Gold



FIG. 88.—Entrance to Gold Mine.

is mined in most of the states in the western half of the country, but chiefly in Colorado and California, as shown in Fig. 87.

Silver. — Silver comes next to gold in its coining value, the output of the United States being about 33 per cent of the world's total product. Silver is mined in nearly all the states and territories in the Rocky Mountain region, the relative production being shown in Fig. 89.

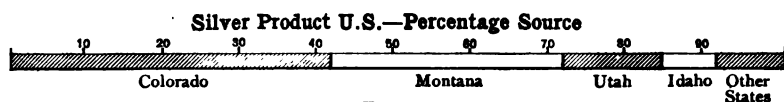


FIG. 89.

The ores of silver are seldom sufficiently rich to warrant extended transportation, so that they are roasted and smelted generally in the neighborhood of the mines. The product of the first smelting, however, commonly a *lead matte*; *i.e.* metallic lead containing a considerable proportion of silver, may be transported to distant smelters, at Omaha, or even to Newark, New Jersey.

Lead. — The United States produces about 25 per cent of the world's output of lead. Most of it is mined in connection with silver, coming from silver-bearing ores. Only that obtained from the Joplin District in Missouri and Kansas, and from southwestern Wisconsin, is mined primarily for the lead or zinc in the ore.

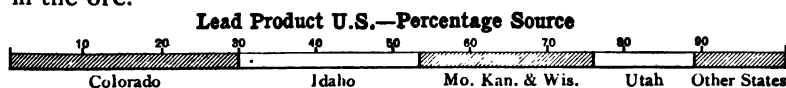


FIG. 90.

Figure 90 indicates that Colorado produces nearly one third of the lead output; but counting the import of ores from adjoining states to its smelters, at Pueblo and Denver, Colorado furnishes nearly one half of the lead produced in the country.

Zinc. — The value of the zinc produced in the United States is equal to about three fourths that of the lead. The Joplin-Galena District of Missouri and Kansas produces about one half of this output. The oxide of zinc, a variety of white mineral paint formed by burning zinc in air, has a value of a little more than one fourth of the total of the zinc output.

Aluminium. — Most of the aluminium comes from the neighborhood of Niagara Falls, where cheap electric power is available for its production. The United States produces about half the world's total product. The rapid increase in the amount of this metallic product, together with the decrease in its price, seems to render it probable that this metal will, in a short time, become one of the principal metallic products of the world.

Quicksilver or Mercury. — The total product of the United States amounts to about 30 per cent of the world's output. This comes mostly from California. It is largely employed in this country for the extraction of gold from its gangue or matrix by the amalgamating process. About one third of the total product is exported.

Antimony. — Only about half a million dollars' worth of this metal is produced yearly in the United States, chiefly from imported ores.

Platinum. — This metal is generally found associated with gold-bearing minerals, and only a very small amount is produced in this country.

Nickel and Cobalt. — These metals are generally found associated with each other. Some nickel is found in Missouri.

NON-METALLIC MINERALS

The non-metallic products of the United States, named in the order of their money value, are coal, petroleum, building stone, natural gas, cements, mineral waters, salt, phosphate rock, limestone for iron flux, clay other than brick clay, gypsum, pyrite, borax, mineral paints, grindstones, asphaltum, fibrous talc, soapstone, and sulphur.

Coal. — This country produces about 33 per cent of the world's total output. The coal output is usually the most valuable mineral product of this country, although its total value is less than that of our hay crop.

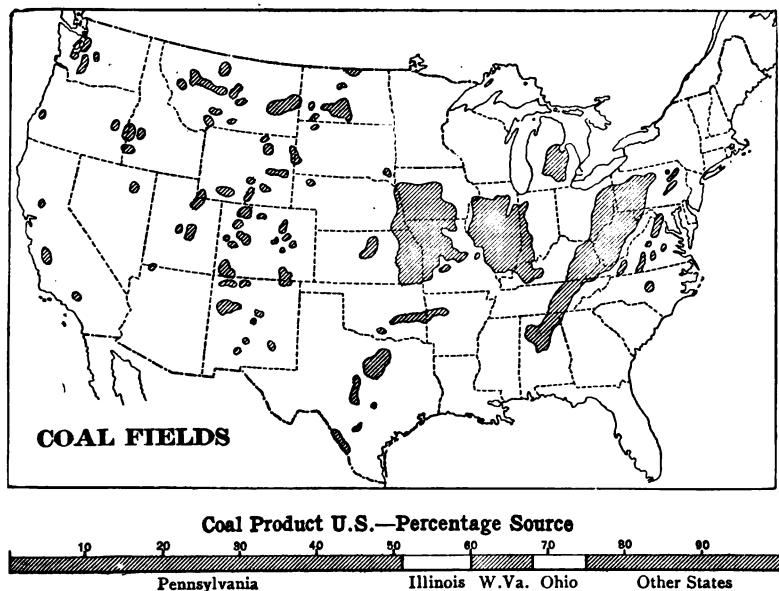


FIG. 91.

Figure 91 shows approximately the extent of our coal beds, and the relative production of the chief coal-mining states. Pennsylvania alone produces half the output of the country.

Bituminous Coal. — Nearly all the regions shown in the map are of bituminous coal, the principal regions being : (1) the coal fields of the Appalachian Mountain region, including the states extending from New York to Alabama ; (2) the central coal field, which includes Illinois, Indiana, and Kentucky ; (3) the northern or Michigan region ; (4) the fields west of the Mississippi ; (5) those of the Rocky Mountain region, consisting of numerous isolated basins ; and (6) those of the Pacific coast, including especially the coal fields of Washington.

Nearly 10 per cent of the output of bituminous coal is converted into coke. Pennsylvania produces more than half of the amount, and West Virginia and Alabama produce about half of the remainder. Since coke is almost essential to the production

of iron and steel, its cost has a great influence on the cost of these products. The immense production of iron and steel in this country is therefore largely due to the cheap rate at which coal can be mined, coked, and shipped to the furnaces.

Anthracite Coal. — The anthracite coal fields occur in the northeastern part of Pennsylvania. Although the total area covered by these valuable deposits is small, amounting to only 480 square miles, yet the deposits are so great that there is, probably, a sufficient supply of this kind of coal to last for hun-



FIG. 92. — Interior of Coal Mine.

dreds of years to come. A small amount of anthracite, about one fourth of one per cent of the total supply, is produced by Colorado and New Mexico. In spite of the limited area in which it is mined, the weight of the output is more than one fourth and the value nearly one half of the bituminous coal mined in this country. Anthracite forms an important article of commerce for states as far west as the Missouri River. New York City and the neighboring points of New Jersey form one of the largest coal markets in the world, being exceeded by London alone.

The foreign commerce of the United States in coal is comparatively limited. A little coal is imported from British Columbia and Nova Scotia, and about 5,000,000 tons are annually exported into Canada and Central and South America. Domestic commerce in coal, however, is of immense proportions. Two thirds of the total product of bituminous and anthracite coal mined in Pennsylvania is carried for consumption beyond

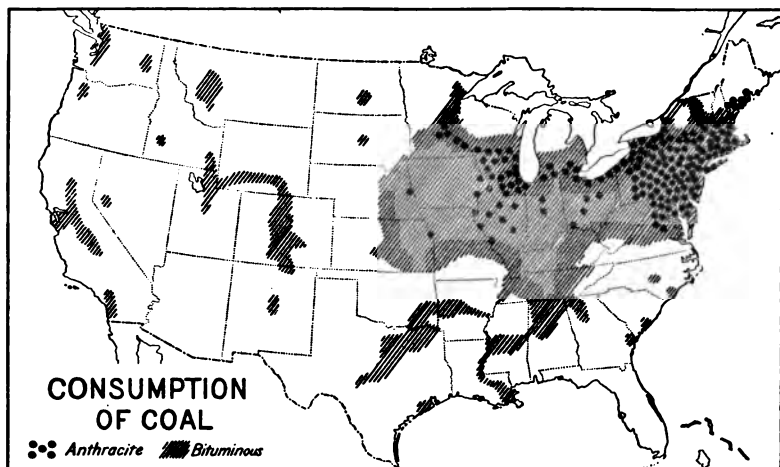


FIG. 93.

the limits of the state. The market for this product extends as far west as the Mississippi River, and even beyond this river in Missouri. Its market on the south is practically limited by the Potomac and the Ohio, considerable traffic in this material being carried on down the Ohio River. Figure 93 shows the consumption of bituminous and anthracite coal for the various purposes of manufactures, mining, and transportation, as well as for domestic purposes.

Petroleum. — Although the production of petroleum in southern Russia is about the same as in the United States, yet, on account of the greater purity of the United States product, her refined petroleum forms the principal source from which the world draws its supplies.

The principal regions producing petroleum are shown in Fig. 94. The Appalachian oil field, situated in a strip of country about 140 miles in length from northeast to southwest, and from 25 to 40 miles in breadth, and including western Pennsylvania, south-western New York, southeastern Ohio, and western Virginia, has been the most important. Another large oil-producing area lies in Ohio and Indiana. In 1901 oil was discovered in large quantities in eastern Texas, in the neighborhood of Beaumont.

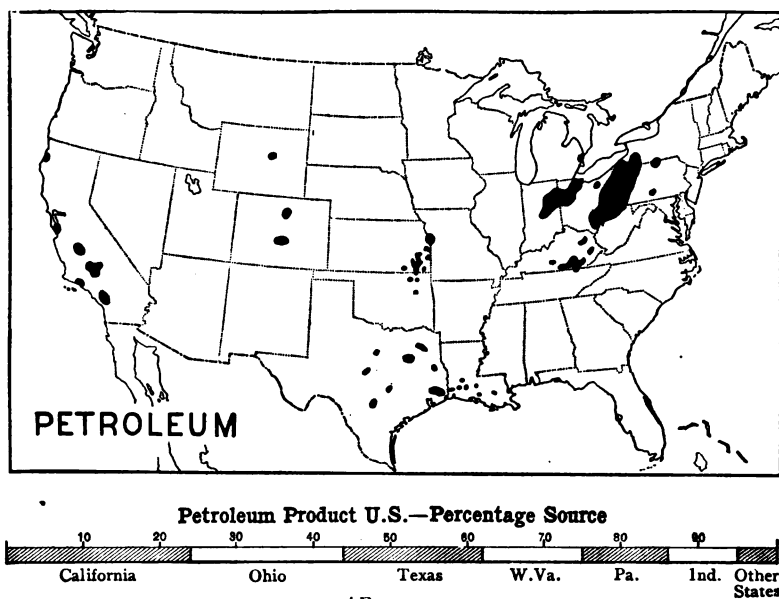


FIG. 94.

California also possesses valuable coal oil fields, and in 1903 produced more petroleum than any other state, though the oil fields in Kansas are said to have more recently surpassed the California fields in productiveness. The oil is pumped from the wells directly into tanks, or is pumped through pipe lines to the refineries, the principal of which are situated at Bayonne, N.J., Whiting, Ind., Cleveland and Lima, O., Philadelphia and Oil City, Pa.

About 45 per cent of the oil produced in the United States is exported, most of it going to Great Britain and the continent of Europe.

Natural Gas.—As we have seen, natural gas is generally associated with oil. It is obtained from wells drilled as for oil, and is conveyed from the wells to neighboring cities, where it is consumed mainly for heating purposes. The cities of Pittsburg, Allegheny, Buffalo, Cleveland, Detroit, Toledo, Columbus, Fort Wayne, Indianapolis, and many smaller places are thus supplied.

Building Stone.—Building stone forms an important part of the mineral products of the United States. The value of the stone employed for buildings, etc., in 1903, reached the great total of nearly \$68,000,000. Building stone is obtained from various parts of the country, and consists of granite, limestone, sandstone, slate, and marble. Excellent *marble* is obtained from Vermont and Tennessee; *limestone* from Pennsylvania, Illinois, Indiana, and Ohio; *granite* from Maine and New Hampshire; *sandstones* from Ohio, Pennsylvania, and New York. *Slate* is obtained generally from the Appalachian Mountains. Besides the building stone above referred to, there should be mentioned *limestone for iron flux*, the value of which, in addition to that above cited, exceeded \$5,000,000.

Cement.—The total value of cement manufactured in the United States reaches about \$32,000,000.

Mineral Waters.—These are of various kinds, *i.e.*, *carbonated*, or charged with carbonic acid gas; *chalybeate*, or those containing iron; *salines*, or those containing salt, and various others. Many of the mineral waters are employed for medicinal purposes. The total value of mineral waters produced in the United States in 1903 was about \$9,000,000.

Salt is an extremely valuable article, necessary to the life of both man and beast. It is used as a condiment, and as a preservative for foods and hides. It is extensively employed also in chemical operations. The average product of the United States has a money value of \$6,000,000. Salt is obtained from New York, Michigan, Kansas, Ohio, and California. It is

practically all consumed in this country, and a considerable amount is also imported.

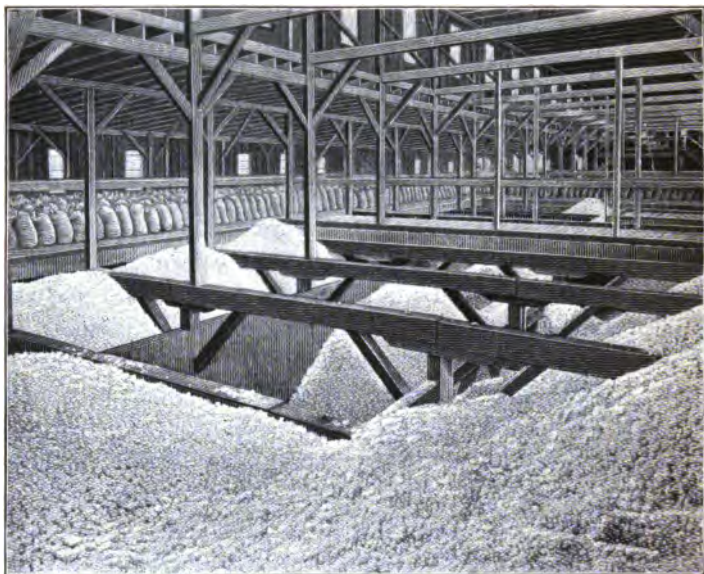


FIG. 95.—Salt Works.

Phosphate Rock. — The best comes from Florida. South Carolina and Tennessee also produce fairly large quantities. The money value of this material produced is about equal to that of salt.

Clay, for the manufacture of bricks, earthenware, and porcelain, is obtained in large quantities in New Jersey, Ohio, and in various other parts of the country. Kaolin, a variety of clay free from iron, and suitable for the manufacture of porcelain and china, occurs in immense deposits in Florida.

Gypsum, or sulphate of lime, is calcined in order to produce *plaster of Paris*. It occurs generally in connection with beds of rock salt, and is probably due, like the salt, to the evaporation of ocean water.

Pyrite and Sulphur. — Pyrite, or metallic sulphides, generally of iron and copper, is one of the sources of sulphur required for

the manufacture of sulphuric acid, matches, and gunpowder. The sulphide occurs in certain mining districts in connection with the ores.

Some Other Non-metallic Products. — *Borax*, used in soldering readily oxidizable metals, and for fixing colors on porcelain, is found in various parts of the west. *Mineral paints*, such as *ocher*, *umber*, *Venetian red*, *sienna*, *ground soapstone*, and *ground slate*, are produced in different parts of the country. The total value of these products reaches about three quarters of a million dollars annually. *Grindstones* and *whetstones* are obtained from Ohio, Michigan, and Arkansas. *Asphaltum* occurs in California, Utah, and Kentucky.

CHAPTER XVI

UNITED STATES — MANUFACTURES

THE United States leads the world as a manufacturing nation. Although, approximately, nine tenths of her manufactured products are consumed at home, yet she imports vast quantities of manufactures from other nations. The manufactured goods of the United States have now reached a value equal to twice those of Great Britain, which only a short time ago led the world. An excellent market is found in the United States for both domestic and foreign goods. The wealth of the nation generally permits the people to spend more money for the necessities and luxuries of life, than can those of any other nation in the world. Some idea of the rapid growth of the manufactures of the United States may be gathered from the fact that while in 1870 their total value was but little over 4 billion dollars, in 1880 it was over 5 billion dollars, in 1890 over 9 billion dollars, and in 1900, 13 billion dollars.

These figures are the values of the manufactured goods and not the values which the manufacturing processes give. To obtain the true value of the manufacturing industry the value of the raw material must be subtracted. Thus in 1900 the cost of raw material was over 7 billion dollars, and the value of the manufacturing industry nearly 6 billion dollars. That is, the processes of manufacture added this amount to the value of the raw materials.

Some of the Leading Manufactures of the United States. — The manufactures of the United States are characterized both by their extent and variety. In extent they exceed those of any other nation; in variety they are almost infinite. While manufacturing is carried on in all parts of the Union, it is most important in the densely populated regions in the northeastern section of the country.

Some of the more important manufactures are of textiles, iron and steel, slaughtering and meat-packing products, lumber, flour and grist mill products, smelting and refining of metals, alcoholic liquors, and boots and shoes.

Variety of Textile Manufactures. — The textile manufactures in the United States can be divided into three general classes; viz., woolen, cotton, and silk manufactures. To these classes must be added an intermediate class in which any two or all of the three above mentioned materials may be employed in the production of a single fabric.

The woolen goods manufactured in the United States compare favorably with those produced by any other country, and the character of the machinery employed is equal to that in any other part of the world.

In connection with the development of our textile industries very earnest efforts have been made to care for textile education. In Philadelphia the Philadelphia Museum and School of Industrial Art; in Boston the Massachusetts Institute of Technology; and various textile schools established at Lowell and New Bedford, and in parts of the Southern States have been established for this purpose.

Woolen Manufactures. — Woolen manufactures are divided into the following classes, viz.: (1) woolen goods; (2) worsted goods; (3) felt goods; (4) hosiery and knit goods; (5) fur hats.

Woolen goods include broadcloths, cassimeres, satinets, jeans, flannels, blankets, shawls, woolen dress goods, worsted cloths, braids, plushes, and carpets.

The manufacture of felt goods, such as are formed into a rough cloth by beating in a manner similar to the production of better goods from fur, includes such materials as felting for slippers, shoes, and piano keys; and polishing belts for wheels. Felt goods also properly include wool hats, that is, felted wool.

Shoddy is a fiber recovered from woolen, worsted, and mixed rags. It is employed principally in the production of low grade satinets, and other heavy cotton warp goods.

Hosiery and knit goods include stockings and underwear. The production of machine-knit goods in the United States

exceeds the total production of the rest of the world. In most knit woolen goods a certain quantity of cotton and silk is employed.

The relative value of wool manufacturing in the various states is shown in Fig. 96.

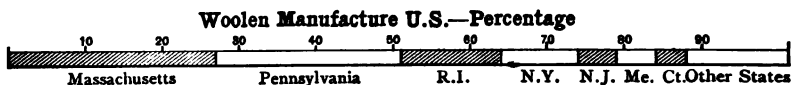


FIG. 96.

The carpet mills of the United States produce a greater amount and a more varied product than those of any other nation. The principal cities of the United States, in which this industry is carried on, are Philadelphia, Lowell, Hartford, New York City, and Yonkers. Among these cities Philadelphia is easily first, producing more carpets than all the rest of the country combined. The entire woolen industry is growing rapidly.

The great center of the manufacture of fur hats, a variety of felted wool goods, is Danbury, Ct. This city produced, in 1900, 18 per cent of the total product of the country. Newark, N.J., comes next in this respect, with 12 per cent, and then follow Philadelphia, Orange, N.J., New York City, Norwalk, Ct., Reading, Pa., and Bethel, Ct. Bethel, although last in this list, is almost wholly given up to this line of manufacture, the value of the wool hats manufactured being 80 per cent of its entire manufactures. Danbury, Ct., comes next in this respect, with 69 per cent.

A great variety of both fine and coarse cotton goods is manufactured in the United States, a considerable proportion of which is exported to other parts of the world. Sheetings, drillings, and jeans are especially sent to the markets of China and Japan.

Manufacture of Cotton Goods.—The cotton industry of the United States was established in New England, where there were to be found both a moist climate and cheap water power. At present, however, the air in cotton manufactories is rendered moist artificially, and cheaper power can be obtained elsewhere. The relative importance of cotton manufacture in the various states is shown in Fig. 97.

Although Massachusetts has long led all other states in the production of cotton goods, there is at the present time a movement toward the increase of the industry in the Southern States, and the future promises a large development of this industry in that section.

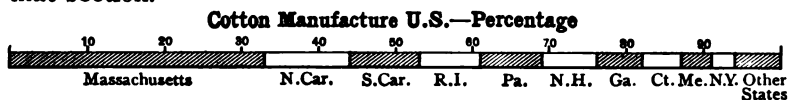


FIG. 97.

The following places, named in the order of their importance, are especially noted for the production of cotton goods; viz., Fall River, Lowell, New Bedford, Philadelphia, Manchester,

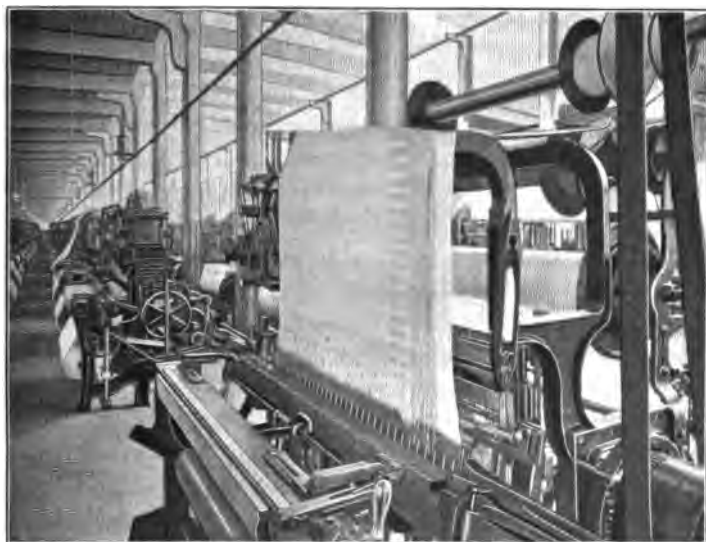


FIG. 98.—Interior of Cotton Mill.

Lawrence, Pawtucket, Lewiston (Me.), Taunton, Warwick (R.I.), Holyoke, and Augusta, Ga. Of the above cities, Lowell, Fall River, Lawrence, and Manchester have valuable water powers. In Warwick the value of the cotton goods reaches 71 per cent of the total value of all manufactured products for that place;

in Fall River 68 per cent, in New Bedford 65 per cent, and in Lewiston 54 per cent.

Hosiery and Knit Goods. — This branch of the textile industry has existed in Cohoes, New York, from 1832, when the first power-knitting machine made in the world was constructed there. The principal centers of the industry are Philadelphia, Cohoes, and Amsterdam, and the value of their combined products reaches 23 per cent of the total product of the country. The principal states, named in the order of their production of hosiery and knit goods, are New York, Pennsylvania, Kentucky, and Massachusetts. The principal articles produced in Philadelphia are hosiery, while in Cohoes the chief product is underwear and other knit goods.

Silk Manufactures. — The United States uses nearly one third of the world's total production of raw silk, and has become one of the greatest silk-manufacturing countries in the world, supplying its inhabitants with, approximately, five sixths of the silk goods they consume. Silk manufactures require especially skilled labor, and it is therefore interesting to note that the number of silk factories is constantly and rapidly increasing.

The principal silk-manufacturing states are New Jersey, Pennsylvania, New York, Connecticut, and Massachusetts. The principal center of the silk industry is Paterson, N.J., which owes its prominence to the near market in New York City, as well as to the fine water power furnished by the falls of the Passaic River. Its product includes silk cloth, ribbons, and sewing silk. This place produces nearly one fourth of the total product of the country. New York City, Philadelphia, West Hoboken, Scranton, Allentown, and Jersey City are other important centers.

Manufacture of Iron and Steel. — This comes next in value to the textiles. The principal seat of this industry is western Pennsylvania, in the region round about Pittsburg.

The use of coke for fuel, and the general employment of Lake Superior iron ore, has caused the center of production of the iron industry to move from eastern Pennsylvania, where

anthracite was employed, to the western part of the state. In this part of the state natural gas also is used; it furnished 23 per cent of the rolling mills and steel works with their fuel during 1900. The iron district of Ohio is, in reality, only a continuation of the Pennsylvania district, while the iron industry in Illinois arises from the excellent market afforded by Chicago for iron products.

The principal cities in the iron and steel industries, named in the order of their products, are Pittsburg and McKeesport, Pa., which produce between them 15.6 per cent of the total product

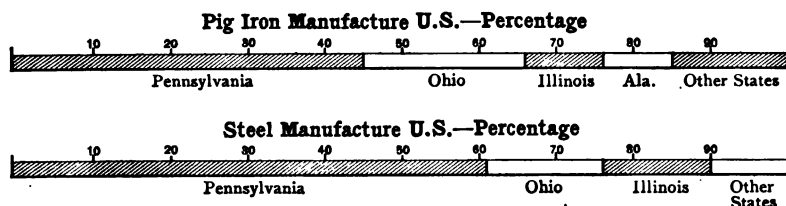


FIG. 99.

of the country; and then Chicago, Ill., Youngstown and Cleveland, O., Johnstown and New Castle, Pa., Joliet, Ill., Trenton, N.J., and Scranton, Pa.

This industry is most highly specialized at McKeesport, where the value of the product amounts to 92 per cent of the total manufactures. Next comes Youngstown, 81 per cent, and Johnstown, 79 per cent.

Iron and Steel Manufactures. — The principal of these are *steel rails* for the railroads, which are made mainly in Pennsylvania, and as a rule in the same establishments which smelt the iron and make the steel. About 90 per cent of the *structural steel* for bridges and frames for buildings is also made in Pennsylvania.

The manufacture of *machinery* of all kinds is an extensive industry in the United States. Much of this is used in the industrial establishments of our own country, but considerable quantities, especially of agricultural and electrical machinery, are exported to Europe, Canada, Australia, and Argentina.

Shipbuilding is increasing in the United States. The steel

ship-building plants at Philadelphia, Newport News, near Camden and Elizabeth (N.J.), Baltimore, Bath (Me.), and San Francisco are among the largest in the world.

Slaughtering and Meat-packing Industries. — These industries had their beginning at Cincinnati, Ohio, in 1813. Since that time the industry has moved toward the west, the location of

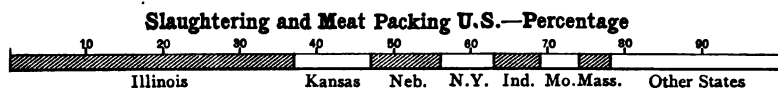


FIG. 100.

such plants being necessarily dependent on the location of the stock-raising and stock-fattening districts, as well as nearness to the market.

These industries are located chiefly in Illinois, Kansas, and Nebraska. They yielded very nearly half the total value of all manufactured products in Nebraska, in 1900; 43 per cent in Kansas; and 22 in Illinois.

The principal centers of the slaughtering and meat-packing industries are Chicago, Kansas City (Kan.), and South Omaha. Less important centers are St. Joseph (Mo.), Indianapolis, St. Louis, Buffalo, Cincinnati, Cleveland, Milwaukee, Baltimore, Philadelphia, and New York City. From these centers fresh meat is sent in refrigerator cars to numerous cities and towns, where it is kept in cold storage houses, and from these sold to local markets. Refrigerated beef is also exported in ships to different parts of the world. Improvements in the transportation of refrigerated beef have made it possible so greatly to increase the amount sent in this way that it is now nearly two thirds as much as that exported as live stock. Practically all this refrigerated beef goes to Great Britain. A considerable trade is carried on also in canned beef, the meat being packed in hermetically sealed cans. Much was also formerly sent to different parts of the world in salt or brine, but refrigerated beefs are rapidly driving both the canned and salt beefs out of the market.

Lumber and Timber Products. — The total lumber and timber products of the United States during 1900 amounted to \$567,000,000. Some of the most important timber markets are Boston, Albany, and New York for spruce; Detroit, Chi-

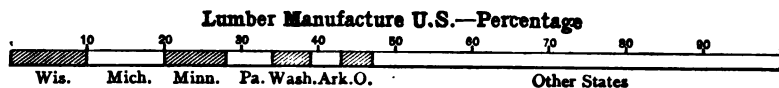


FIG. 101.

cago, and Minneapolis for white pine; St. Louis and Memphis for hard woods; New Orleans for long and short leaf yellow pine; Portland (Ore.), Seattle, and Tacoma for spruce and cedar; and Eureka (Cal.) for redwood.

Manufactories of furniture are scattered throughout the northern part of the country. New York, Chicago, and Grand Rapids are among the most important.

The manufacture of *barrels* and *casks* is an industry of importance. The staves are usually manufactured in lumber mills and shipped to cooperage shops, where they are "assembled" into barrels or casks.

Agricultural Implements. — In this branch of manufacture there is a tendency to localize near the agricultural centers, but more especially in the great grain-producing sections, so that the industry has moved gradually westward with the opening of new areas for the production of grain. A contributing cause for this movement was the high freight rates charged for the shipment of these machines, which occupy much car space.

Illinois, Ohio, and New York lead all other states in this industry. Then come Wisconsin, Indiana, Michigan, and Pennsylvania.

The principal cities, named in the order of their production of this class of manufactured goods, are Chicago, Springfield (O.), Racine (Wis.), Auburn (N.Y.), South Bend (Ind.), Peoria, Dayton, and Milwaukee.

Carriages and Wagons. — This industry is mainly centered in the following states, that are named in the order of their pro-

duction: Ohio, New York, Indiana, Michigan, Illinois, Pennsylvania, Wisconsin, Massachusetts, Minnesota, and Connecticut.

Paper and Wood Pulp.—These industries are necessarily located in the regions where the supplies of spruce and poplar, employed for producing the wood pulp, are obtained, and where

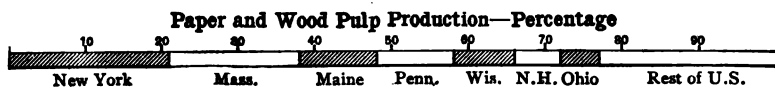


FIG. 102.

the necessary water power can be had for operating the heavy grinding machinery. In the mixing and preparation of the pulp the purity of the water supply is also a matter of importance. It is natural also that, other things being equal, the timber districts nearest to the great publishing centers of the New England and Middle States will be exploited first. The principal supplies of spruce are in Maine, New Hampshire, Vermont, and New York. Figure 102 shows the percentage of the products of paper and pulp obtained from the various states.

Flour and Grist Mill Products.—The total value of these is nearly equal to that of the lumber and timber products. Flour forms an important article of export from the United States. Great Britain takes nearly one half of the quantity exported.

Minnesota leads all the other states in the value of products. This state produced 21 per cent of the total product of the country in 1900. Ohio came next with 8 per cent, and Illinois 6 per cent.

Minneapolis is the largest milling center in the world. Superior also has large mills.

Alcoholic Liquors may be divided into three classes, viz. :—

(1) Malt liquors, including beer, ale, and porter, obtained by the fermentation of malt infusions.

(2) Distilled liquors, including the ardent spirits separated by distillation from fermented fruit juices, molasses, or malted infusions of grain. These include alcohol, cologne spirits, whisky, and brandy.

(3) Vinous liquors, including wines obtained from the juice of the grape. Figure 103 shows the percentage of each class produced in various states.

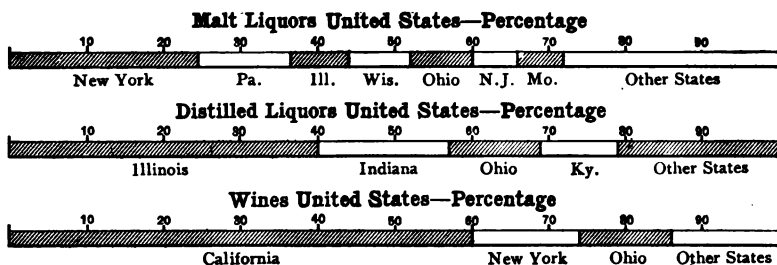


FIG. 103.

About nine tenths of the wine consumed in the United States is of home production; of this, more than half comes from California. Distilled spirits, whiskies, and brandies also are produced chiefly in Illinois and Indiana, while New York and Pennsylvania malt the largest quantity of beer and ale. Very little of these commodities is exported, but they are important articles of domestic commerce.

Tanned, Curried, and Finished Leather.—The principal states in which this industry is carried on, named in the order of their importance, are Pennsylvania, Massachusetts, New York, Wisconsin, New Jersey, Delaware, Illinois, and California. In 1900 the first three states produced 51.4 per cent of the total product. (See Fig. 104.)

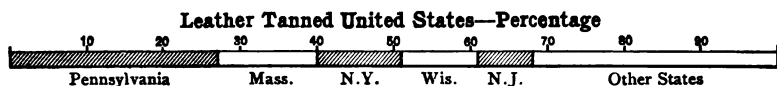


FIG. 104.

The leather industry of the United States had its origin at Lynn, Mass., about 1630, but in 1880 the industry moved toward Pennsylvania and the Western States. The principal center of the industry at present is Philadelphia, where the

chrome acid process is employed. This city produced, in 1900, nearly 9 per cent of the total product of the country. Newark, Milwaukee, Wilmington (Del.), and Chicago are also important centers.

Boots and Shoes.—The United States leads the world in the manufacture of boots and shoes. Massachusetts leads all other states, producing nearly 45 per cent of the total output of the country. (See Fig. 105.)



FIG. 105.

The chief cities in which this industry is pursued, named in the order of their production, are Brockton, Lynn, and Haverhill (Mass.), New York, Cincinnati, St. Louis, Rochester, Philadelphia, Chicago, Manchester, Boston, Columbus (O.), and Salem and North Adams (Mass.).

Leather Gloves and Mittens are manufactured principally in the states of New York, Illinois, California, and Wisconsin. The center of this industry is Gloversville, N.Y., where the manufacture of these goods was established in 1760. Johnstown, N.Y., and Chicago, Ill., are also important centers.

Printing and Publication.—This includes the printing and publication of newspapers, periodicals, and books. The extent of this industry may be judged from the fact that $1\frac{1}{4}$ billion pounds of paper were employed for this purpose in the United States during 1900, distributed as follows: newspapers, over 950 million pounds; books and periodicals, 200 million pounds; and job printing the remainder.

Cheese, Butter, and Condensed Milk. The average annual value of the dairy products of the United States is \$600,000,000. A generation ago all the butter and cheese were made on farms and sold in the immediate neighborhood. Now practically all the cheese and nearly one third the butter are made in

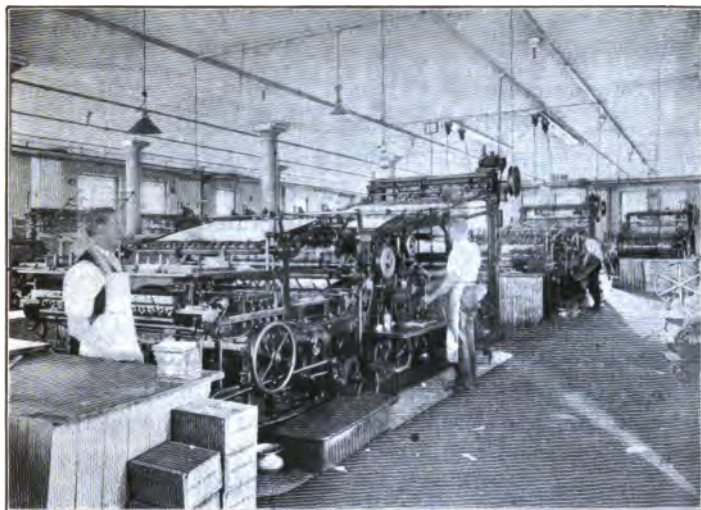


FIG. 106. — Printing Establishment.

factories and are sent great distances to market. Figure 107 shows the source of the factory product.

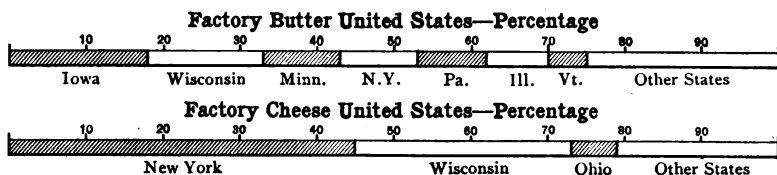


FIG. 107.

The principal states producing condensed milk are New York and Illinois.

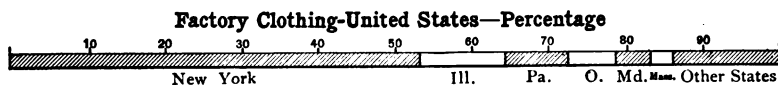


FIG. 108.

Clothing is made in all the states, and in thirty-eight states it is made in factories. The value of the factory product is about

70 per cent of the total. The distribution of the factory product is shown in Fig. 108.

Glass Manufacture.—Although good glass sand occurs in many states, Pennsylvania produces about 40 per cent of the total output of glass, and Indiana, New Jersey, and Ohio produce most of the remainder. In Indiana the glass product has a value of 4 per cent of all manufactured goods. The chief glass-manufacturing centers are Pittsburg, Muncie, Ind., Millville, N. J., Marion, Ind., and Philadelphia.

Pottery, Terra Cotta, and Fire-clay Products.—These industries require skilled labor, and must be located near the supplies of coal or other fuel required to run the furnaces. Figure 109 shows the states in which this industry is most active.

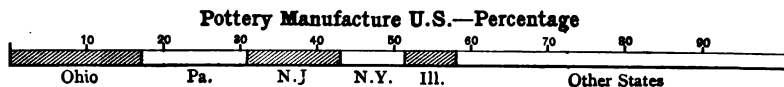


FIG. 109.

Trenton has long been the center for the manufacture of pottery and the coarser grades of earthenware. This city and East Liverpool (O.) are the centers for the production of porcelain and other grades of finer pottery. These two cities produce about 20 per cent of the entire product. Pittsburg, St. Louis, Zanesville, and New York City are other important centers.

Jewelry.—The principal states in which jewelry is made, named in the order of their production, are Rhode Island, Massachusetts, New York, New Jersey, and Illinois. The great center of this industry is Providence. Then come New York, Newark, Attleboro, North Attleboro, and Chicago.

Tobacco.—Manufactures of tobacco consist of cigars and cigarettes, chewing and smoking tobacco, and snuff. Figure 110 shows the states in which such manufactures are most active.

Cigars are made chiefly in New York, Cincinnati, Philadelphia and Pittsburg; cigarettes in New York, Richmond, Durham, and Rochester; and chewing and smoking tobacco in St. Louis, Louisville, Winston (N.C.), and Richmond.

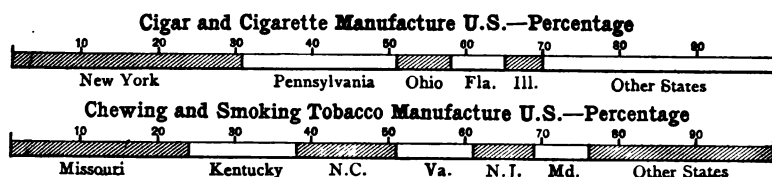
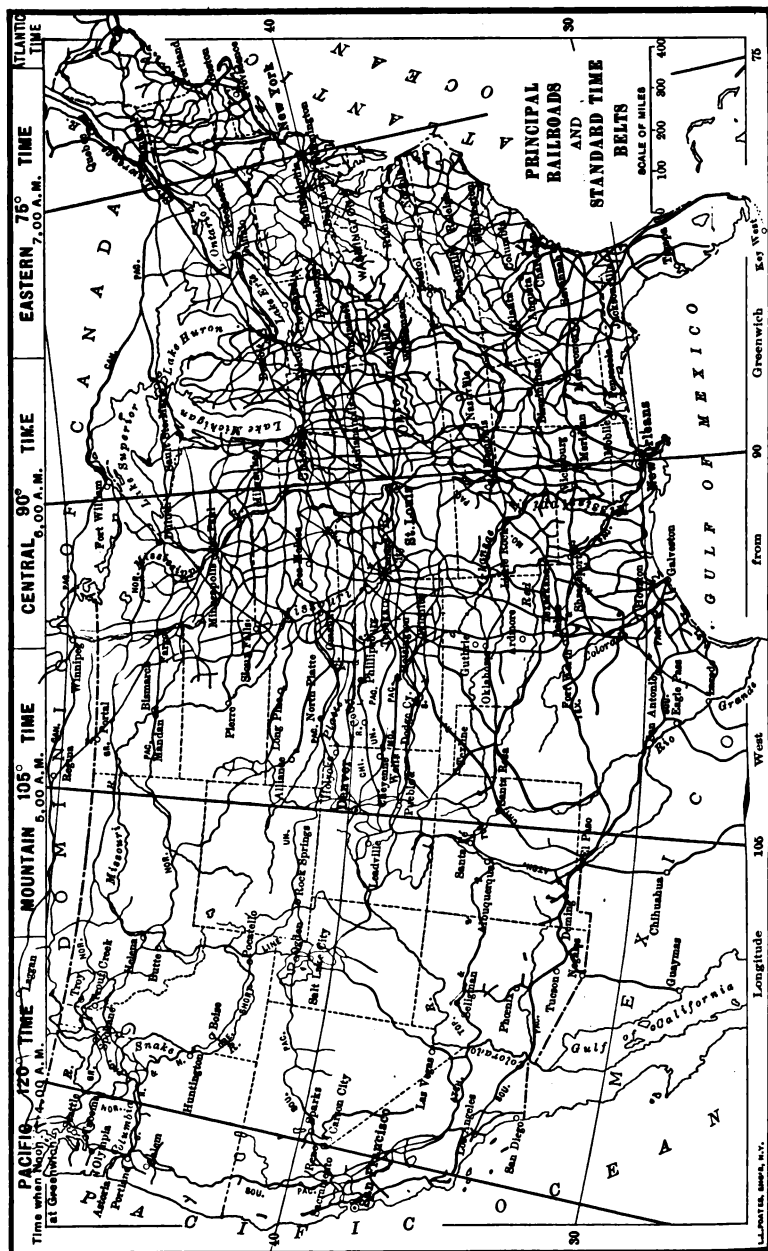


FIG. 110.

Chemicals.—The manufacture of chemicals includes such variety of products as sodas, potashes, alums, coal-tar products, wood distillations, fertilizers, plastic materials, chemicals produced by the agency of electricity, dyestuffs, paints, pigments, varnishes, extracts, essential oils, etc., and is widely distributed. About 60 per cent of the product of this industry is manufactured in New York, Pennsylvania, New Jersey, Ohio, and Illinois.

Other Manufactures.—A great many other specialized manufactures are carried on in various parts of the country. Some of these are, however, centered in certain states; for example, the manufacture of collars and cuffs in New York reaches over 99 per cent of the total product; the manufacture of plated Britannia ware in Connecticut, 66 per cent; the canning and preserving of oysters in Maryland, 66 per cent; the production of clocks in Connecticut, 64 per cent; of coke in Pennsylvania, 63 per cent; of vinous liquors in California, over 60 per cent; of brassware in Connecticut, over 54 per cent; of turpentine and rosin in Georgia, 40 per cent; of distilled liquors (mainly alcohol) in Illinois, nearly 40 per cent; of silverware in Rhode Island, over 36 per cent; and of salt in New York, nearly 34 per cent.

Specialization of Industries.—A tendency exists for industries of the same character to collect or centralize in certain localities. In some cases it is difficult to determine the reason for this concentration. Generally, however, such reason is to be found in the nearness of the location to the materials employed in the manufacture, in nearness to the market, to cheap power, and finally in the fact that at the point where these industries are located the necessary labor and capital can be had.



CHAPTER XVII

UNITED STATES—TRANSPORTATION, COMMERCE, AND POPULATION

Wagon Roads.—There are about 3,000,000 miles of wagon roads in the United States. They vary greatly in character; some of them are excellent macadamized roads, but the vast majority are almost impassable in wet weather. Good wagon roads are very important, since such roads are used as feeders to railroads and practically all the products of the country must be hauled over them for longer or shorter distances. Every year hundreds of millions of tons of freight are hauled over transportation routes of this character.

The fact that poor wagon roads are, after all, the most expensive for all who have occasion to use them, is being more and more generally recognized, and in many parts of the country state and local authorities are coöperating for the purpose of building first class highways.

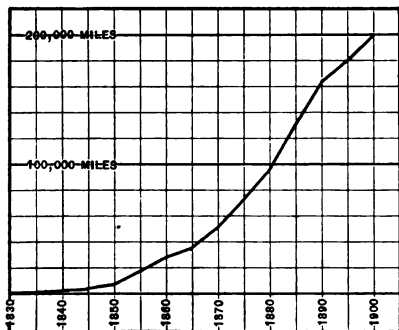


FIG. 112. — Railroad Mileage in United States, 1830-1900.

Railways.—The total length of the railways of the United States is over 200,000 miles, thus exceeding the total mileage of Europe, and is about two fifths of the mileage of the entire world.

The railway system of the United States began in 1827 with the building of the first line for traffic at Quincy, Mass. In 1830 there were 23 miles of railroad. The growth from that year is shown in Fig. 112.

Figure 111, p. 218, shows only the more important of the trunk lines crossing the country from ocean to ocean, or from the Great Lakes to the Gulf. It will be noted that many of the large cities are railroad centers. The zones for standard time, differing by one hour, are also shown.

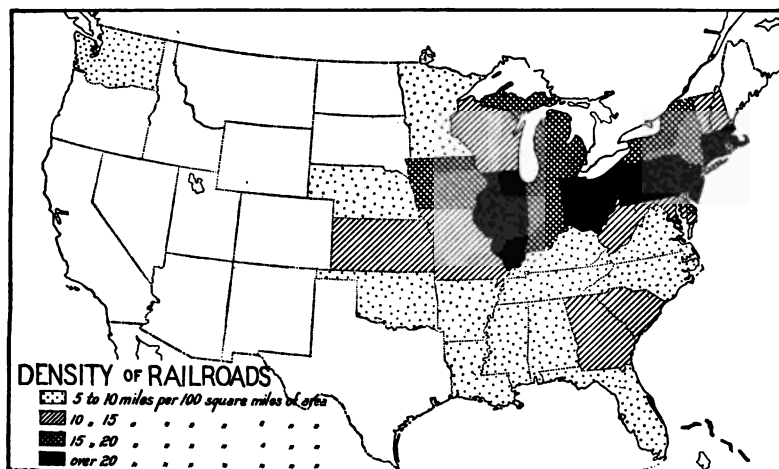


FIG. 114.

The "density of railroads" or the railroad mileage per 100 square miles of area in the various states is shown in Fig. 114.

Shipping.—The total tonnage of the United States merchant marine for 1904 was 6,300,000 tons, of which 5,335,000 tons was in coastwise trade; 889,000 foreign trade; and the remainder in whale and sea fisheries.

The amount of tonnage of all nations that entered and cleared at the principal ports of the United States during 1903 was 49,500,000 tons, of which the Atlantic ports received about 62 per cent.

Most of the vessels engaged in carrying on our foreign trade sail under the flags of other nations,—British, German, Norwegian, Dutch, French, Italian, and Spanish. Only about 16 per cent fly the flag of the United States.

Inland Navigation. — The United States possesses an incomparable system of transportation on its great water routes; *i.e.*, on the Mississippi and its branches, on the Great Lakes, and the St. Lawrence, as well as on the smaller rivers of the Atlantic, the Gulf of Mexico, and the Pacific coast.

The Mississippi and its tributaries furnish a navigable waterway of about 9000 miles and the Great Lakes, from Duluth at the head of Lake Superior to the foot of Lake Erie, some 1050 miles, to which should be added the length of Lake Michigan from the Strait of Mackinac to Chicago, 400 miles. The navigation of the lakes is uninterrupted except at Sault Ste. Marie, between Lakes Superior and Huron, and at Niagara Falls, between Lakes Erie and Ontario. Both of these obstructions are passed by canals: at the Sault, by both an American and a Canadian canal, and at Niagara Falls by the Welland canal in Canada.

The Mississippi is navigable from Minneapolis to the Gulf of Mexico, 1350 miles; the Ohio, from Pittsburg to the mouth of the river at Cairo, 800 miles; the Missouri, from Fort Benton to the mouth of the river, 1500 miles; the Arkansas, from Wichita, Kansas, to the mouth, 600 miles; the Red River, from Gainesville, Texas, to the mouth, 600 miles. Numerous other tributaries of the Mississippi are navigable for greater or less distances, making the greatest traffic-bearing river system on the globe. The principal coastwise and river routes are shown in Fig. 113.

Extent of Transportation by Railroads and Shipping. — The railroads in the United States carry every year more than 650,000,000 passengers for longer or shorter distances, which is equivalent to carrying nearly 20 billion passengers one mile each, or an annual journey of about 250 miles for every man, woman, or child in the land. The freight annually moved by rail is nearly $1\frac{1}{4}$ billion tons, or 157 billion tons carried one mile. The average journey of each ton is one hundred and thirty miles.

Freight rates both by rail and by water have been considerably reduced in recent years, and this reduction has resulted in a vast increase in the commerce of the country.

The rate per-ton-per-mile on railroads is now about $7\frac{6}{10}$ mills; that on canals about two mills; and that on the Great Lakes about six tenths of a mill.

Direction of Transportation.—The agricultural products are transported to greater or less distances, — the food crops for consumption, and the textiles for manufacture. The manufactured products are transported to their various points of consumption. The ores from the iron mines of the Lake Superior districts travel to Chicago, Cleveland, and Pittsburg, and are there smelted.

Wheat is distributed far and wide over the country to the cities, fully one half of the crop leaving the state where it was raised. Corn and oats, as already explained (see pages 175 and 178), are mainly fed to live stock on or near the farms where produced.

Of the cotton crop, one third travels from the Southern States to the northeastern part of the country, where it is manufactured, while another third goes to Europe. Most of the wool of Texas and other Southern States is also carried to the manufacturing centers in the northeastern part of the country. There is thus a general movement of raw materials for manufacture northward and eastward to the manufacturing section and a corresponding movement of manufactured goods outwards in all directions from the manufacturing centers.

Foreign Commerce.—Because the United States is able to supply so many of the things needed in everyday life, it is relatively independent of the rest of the world. Foreign commerce we have undoubtedly, and an enormous one, the exports being greater than those of any other country; but in proportion to the population this country is exceeded in foreign commerce by no fewer than sixteen other countries, including nearly all those of Europe. The foreign commerce of the United States is about \$30 per inhabitant; that of Great Britain and Ireland and of Switzerland is three times as great, of Belgium four times as great, and of the Netherlands ten times as great per inhabitant.

Imports and Exports. — The amount of our foreign commerce fluctuates, of course, from year to year, but shows a general

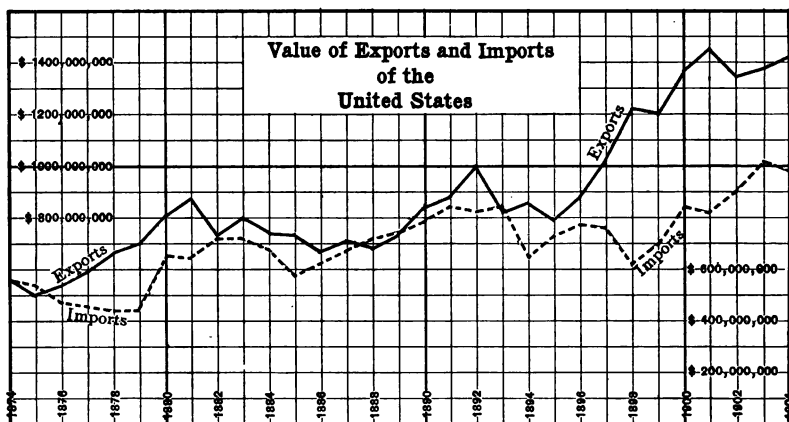


FIG. 115.

tendency to increase as indicated in Fig. 115. In 1904 it had an annual value of about 2400 million dollars, of which about 1000 million were imports and 1400 million, exports. The principal imports and exports of the United States are indicated in Fig. 116.

It will be seen that fully one third of the imports consist of

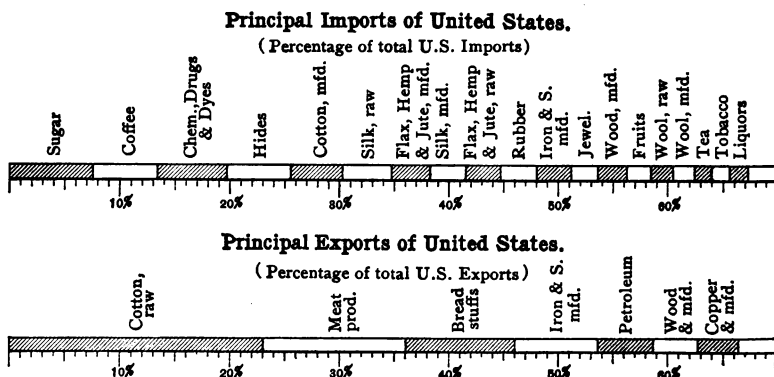
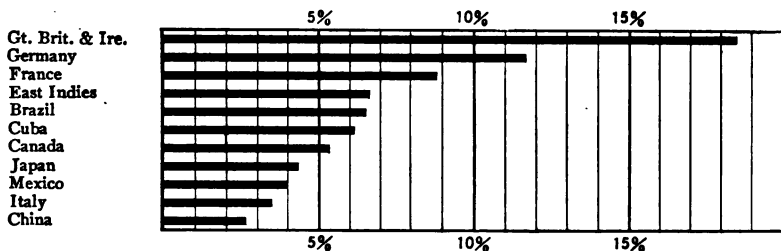


FIG. 116.

tropical or sub-tropical commodities, such as sugar, coffee, drugs, dyes, silk, fibers, rubber, and fruits. The importation of this class of goods is increasing very rapidly from year to year. The natural resources of our insular possessions, Porto Rico, Hawaii, and the Philippines are important in this connection. Our imports from these possessions in 1904 amounted to \$50,000,000, of which Hawaii furnished about one half.

Imports United States—Sources.

(Percentage of total Imports)



Exports United States—Destinations.

(Percentage of total Exports)

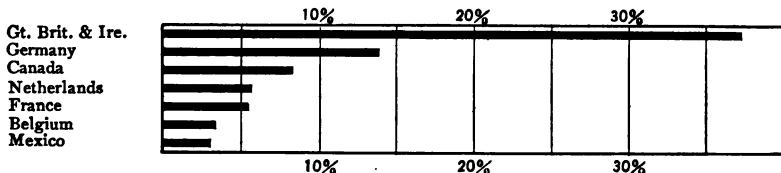


FIG. 117.

Other important exports, but of less value than those shown in the diagram, are live animals, leather manufactures, leaf tobacco, cotton manufactures, agricultural implements, and coal. Figure 116 indicates that agricultural products form the largest part of our export trade. Such products constitute about 60 per cent of the whole, but are decreasing; while the export of manufactures, now about 32 per cent, is rapidly increasing.

The chief countries concerned in our import trade and our export trade respectively, and the share of each in it, are shown in Fig. 117.

Share of the United States in the World's Industries and Products.

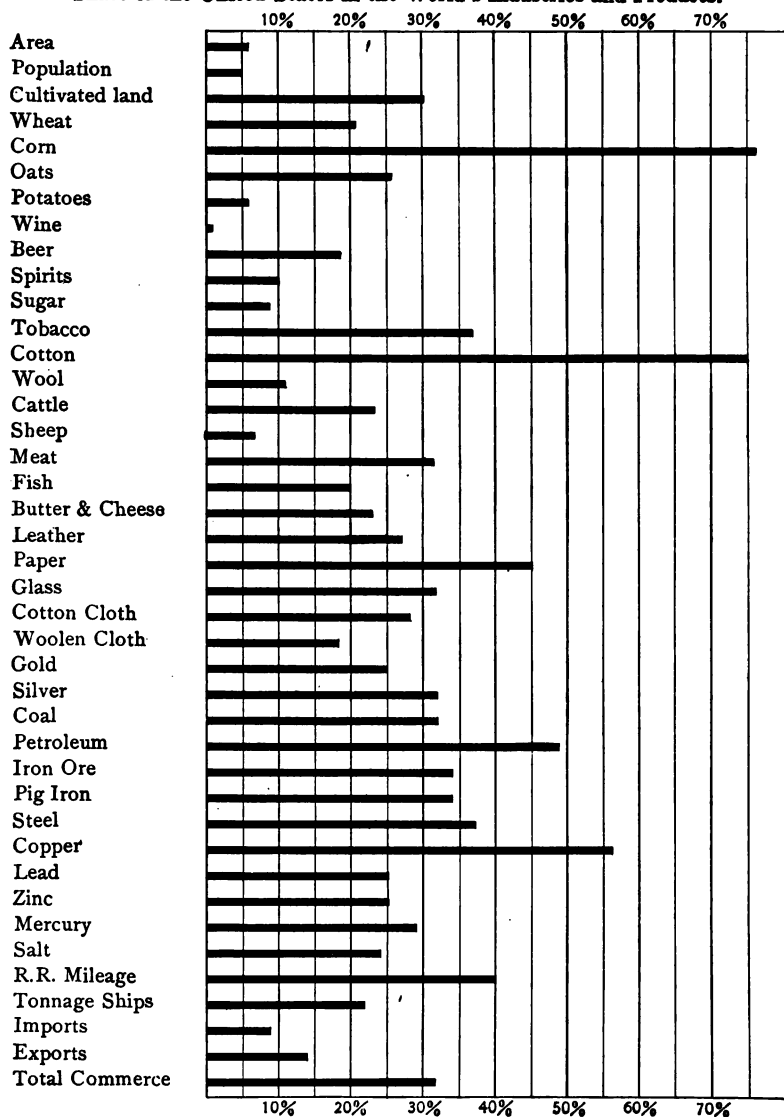


FIG. 118.

Figure 118 shows the share of the United States in the world's industries and products and is worthy of careful study. From this it appears that, with only about 30 per cent of the cultivated land of the world, and but 5 per cent of the population, the United States raises over 20 per cent of the world's wheat, 75 per cent each of its corn and raw cotton, and over 35 per cent of its tobacco. It produces some 32 per cent of its meat, 23 per cent of its butter and cheese, and 20 per cent of its food fish. It manufactures some 45 per cent of its paper, 32 per cent of its glass, and nearly 30 per cent of its cotton cloth. In mineral products it produces 25 per cent of its gold, over 30 per cent each of its silver, coal, and iron ore, about 48 per cent of its petroleum, and over 55 per cent of its copper. It owns over 20 per cent of the tonnage of the world's merchant marine, and 40 per cent of the world's railroad mileage, while it carries on about 32 per cent of the world's total commerce.

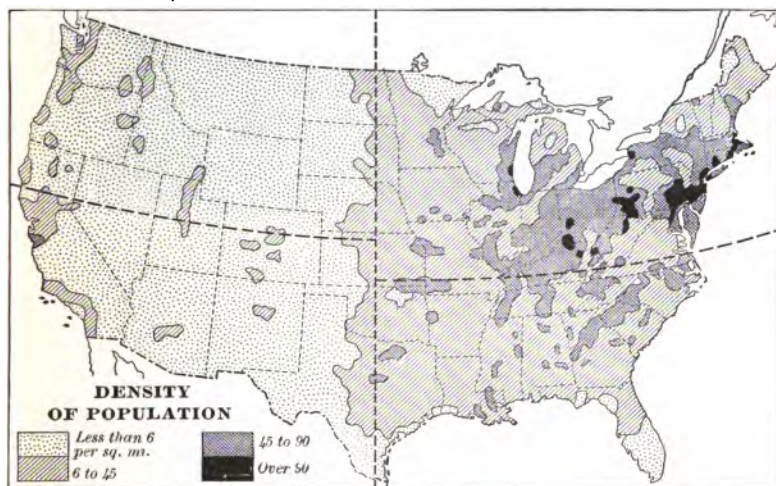


FIG. 119.

Population. — The population of the main body of the United States in 1900 reached 76,000,000, or an average of twenty-five

inhabitants to each square mile, and in 1904 it was estimated to be 81,000,000. The greatest density of population is in the northeastern or manufacturing part of the country. Here the most thickly settled states have a density of population nearly as great as many of the western countries of Europe.

Some Important Cities of the United States.— **New York City**, situated on New York Harbor, is the largest city in America



FIG. 120. — New York City.

and is exceeded only by London among the world's great cities. It possesses unrivaled facilities for commerce. Its harbor is the most capacious, best sheltered, and easiest of access on the Atlantic coast. The valleys of the Hudson and Mohawk afford a low passageway across the Appalachian Mountains, which has been utilized by railways and by the Erie Canal. Over these transportation routes the products of the interior reach the sea.

New York has, therefore, become the greatest commercial city in the United States. Nearly two thirds of all the imports of merchandise that enter the country come in at the port of

New York, and it is the port of departure for more than one third of our exports. Nearly all of the most important transatlantic lines of steamers make New York their principal western terminus. It is also the leading port in the coast-wise trade.

As regards internal transportation, there are no fewer than sixteen lines of railway that converge at the city from the east, north, and west. Those from the east and north enter the city proper, while those from the west have their terminals on the New Jersey shore of the Hudson River opposite the city. Plans are now completed which, when carried out, will enable trains from the west to enter the city by means of tunnels under the Hudson River.



FIG. 121. — New York City and Harbor.

New York has also the most extensive manufacturing interests in the country, the principal manufacturing lines being ready-made clothing, sugar refining, printing of books, making machinery, brewing, and making cigars and cigarettes.

New York is the chief financial center of the United States and is to this country what London is to Europe. It contains about one hundred banks. The total value of exchanges at its clearing house reaches the enormous aggregate of 75 billion dollars yearly, representing more than half the business transacted in all the clearing houses in the country; the clearing houses of Chicago and Boston exchanging only about 8 billion dollars each, and that of Philadelphia about 6 billion dollars.

Chicago, the second city in population in the United States, is situated at the head of Lake Michigan. The Chicago River has been so improved by digging and dredging as to afford the best port on the Great Lakes. It is one of the greatest wheat and corn markets in the world. Chicago ranks second to New York as a manufacturing city. It is the great center for slaughtering and meat packing, doing more than one third of the total business of the country, and has besides large iron and steel plants, and agricultural machine works, producing nearly one fourth of the agricultural implements in the country. As a railroad center it is without an equal in the world, no fewer than twenty-two lines of roads centering in the city.

Philadelphia, which ranks third in population, is situated on the Delaware River at its junction with the Schuylkill. Since the Delaware is navigable up to and beyond the city limits,

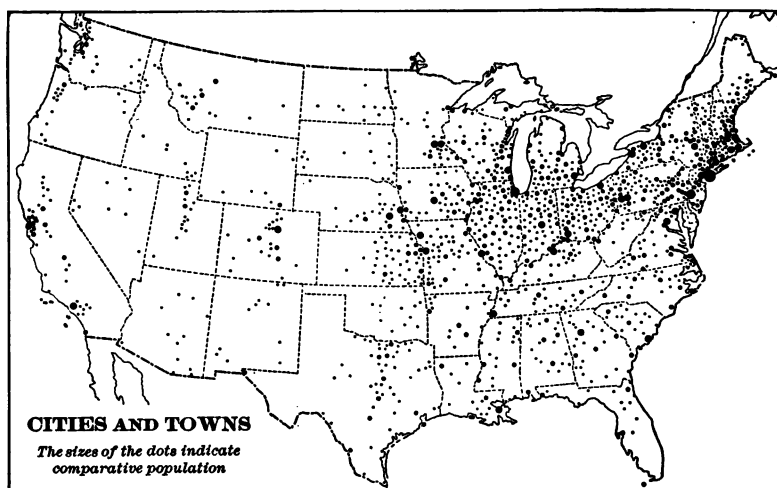


FIG. 122.

Philadelphia has become a seaport of importance, although it handles only about 6 per cent of the foreign trade of the country. Its chief exports are petroleum, corn, meat, and wheat. It is the third manufacturing city in the United States. Its principal

manufactures are carpets (of which it produces 46 per cent of the total output of the country), woolen textiles, clothing, cotton goods, leather goods, chemicals, machinery, including locomotives, refined sugar, and ships.

St. Louis, the fourth city in size, is situated on the Mississippi River in Missouri just south of the mouth of the Missouri River. It is a manufacturing city of great importance and possesses a valuable river and railroad commerce. It manufactures 22.7 per cent of the smoking and chewing tobacco and snuff produced in this country. Its chief products are flour, beer, tobacco, and iron castings.

Boston, the fifth city as regards population, is second in importance as an Atlantic seaport, possessing an excellent harbor. Its imports are second only to those of New York, while its exports are exceeded only by New York, New Orleans, and Baltimore. Its principal imports are wool, cotton, rubber, hides, and coal. Its principal exports are meat and cattle, wheat, leather, and corn. Boston is the distributing center for New England. It is one of the principal manufacturing cities in the country, and is especially noted for the printing of books and the manufacture of iron castings and clothing.

Baltimore ranks sixth in population. It has a good harbor on the western shore of Chesapeake Bay, and is an important commercial and manufacturing city. Its imports are small, but on account of its close connection with the South, both by rail and by water, its exports are large. They consist mainly of corn, meat, copper, wheat, flour, cotton, and tobacco. Baltimore is one of the eastern termini of three important lines of transatlantic steamers. Baltimore ranks seventh as a manufacturing city. Its chief manufacturing interests are the canning of fruits and vegetables, iron and steel works, and tobacco.

Cleveland, Buffalo, Toledo, Detroit, Milwaukee, Duluth, and Erie are lake ports of importance. Cleveland and Detroit are prominent as manufacturing cities, particularly in products from iron ores mined in the Lake Superior iron district. Detroit has large manufactories of steam and street railway cars. Cleveland

is an important point for the refining of petroleum and for the manufacture of steel rails.

Buffalo is situated near the foot of Lake Erie and ranks next to Chicago in importance as a lake port. Most of the commerce traversing the Lakes is transshipped there to the railroads or to the Erie Canal, and it is this breaking of bulk that has made Buffalo a great commercial city. Its harbor has been improved by the construction of extensive breakwaters.

Duluth and Superior, near the head of Lake Superior, are important shipping ports for iron ore and wheat.

San Francisco is only slightly exceeded in population by Buffalo, and is the largest city on the Pacific coast. It is situated on San Francisco Bay, which forms an immense sheltered harbor easy of access. The city is located on a peninsula between the bay and the Pacific Ocean, and has fairly good railroad connections with the interior. About 5 per cent of the imports and exports of the United States enter and depart from this port. Wheat constitutes its principal export. It has considerable manufactures, the chief industry being the refining of sugar.

Cincinnati has a population nearly equal to that of San Francisco or Buffalo, and is a prominent manufacturing city. Several railroads which enter the city, together with the Ohio River, form the principal transportation routes. Malt liquors and clothing are its principal manufactures.

Pittsburg, at the junction of the Allegheny and Monongahela rivers, has an extensive commerce both by rail and by way of the Ohio River. Its great importance is in its manufactures. Included within a radius of twenty-five miles from Pittsburg is the principal center of iron and steel manufactures in the United States. This is owing to the abundance of coking coal, and natural gas, and the favorable position for cheap transportation of iron ores from the Lake districts.

New Orleans, on the left bank of the Mississippi River, about one hundred miles from its mouth, is the principal commercial city of this part of the country. Although it receives but a small part of the imports of the country, it ships nearly 13 per

cent of the exports, in which respect it is exceeded by New York City alone. Its principal export is cotton, of which staple it is the chief shipping point. Its manufactures are comparatively unimportant.

Washington, the capital of the United States, situated at the head of navigation of the Potomac River, is chiefly a residential city, the industries being little more than are required for the support of its inhabitants.

Louisville, situated at the falls of the Ohio, is of prominence as a manufacturing city. Tobacco and liquor are its chief products.

Minneapolis, in Minnesota, has the largest flouring mills in the world. It owes its supremacy not only to its position on the edge of the hard-wheat region, but also to its abundant water power furnished by the falls of St. Anthony. For similar reasons it is a center for the lumber industry.

Other Cities of the United States.—Besides the cities mentioned there are many others of industrial importance. Among the ports on the Atlantic coast are *Charleston*, *Savannah*, *Brunswick*, and *Jacksonville*. *Mobile* and *Galveston*, on the Gulf coast, are important cotton ports. On the Pacific coast, Puget Sound in Washington is probably the greatest harbor or collection of harbors on the earth. On its shores two cities, *Seattle* and *Tacoma*, are rapidly coming into importance as commercial ports. They are respectively the termini of the Great Northern and Northern Pacific railroad systems. *Portland*, Oregon, situated on the Willamette just above its junction with the Columbia, and one hundred and twenty miles from the sea, is accessible to large seagoing vessels, and, therefore, forms an important port. It exports a large amount of wheat and lumber.

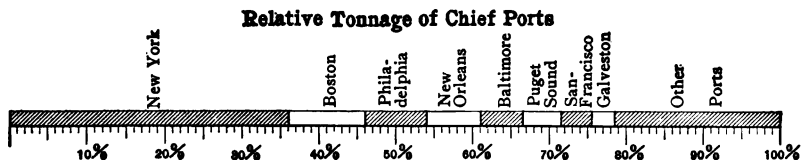


FIG. 123.

The Colonial Possessions of the United States. — The colonies, dependencies,¹ etc., of the United States include Alaska, the Hawaiian Islands, the Philippine Islands, Guam, Tutuila, and Porto Rico.

¹ **The Colonies, Protectorates, and Dependencies in the World**, excluding merely noncontiguous territories, number 140. They include two fifths of the land surface of the globe, and their population numbers about one third of the entire people of the earth. Of those so governed (500,000,000), more than three fourths live in the tropical zone. The total imports of these colonies and protectorates average more than 1½ billion dollars annually, and 40 per cent of this is purchased from the mother countries. The exports greatly exceed the imports, and 40 per cent of these go to the mother countries.

The colonies, protectorates, and dependencies of each of the principal countries of the world will be named in connection with each of these countries, but will be described in connection with the grand divisions or countries near which they lie.

CHAPTER XVIII

ALASKA, CANADA, NEWFOUNDLAND, AND DANISH AMERICA

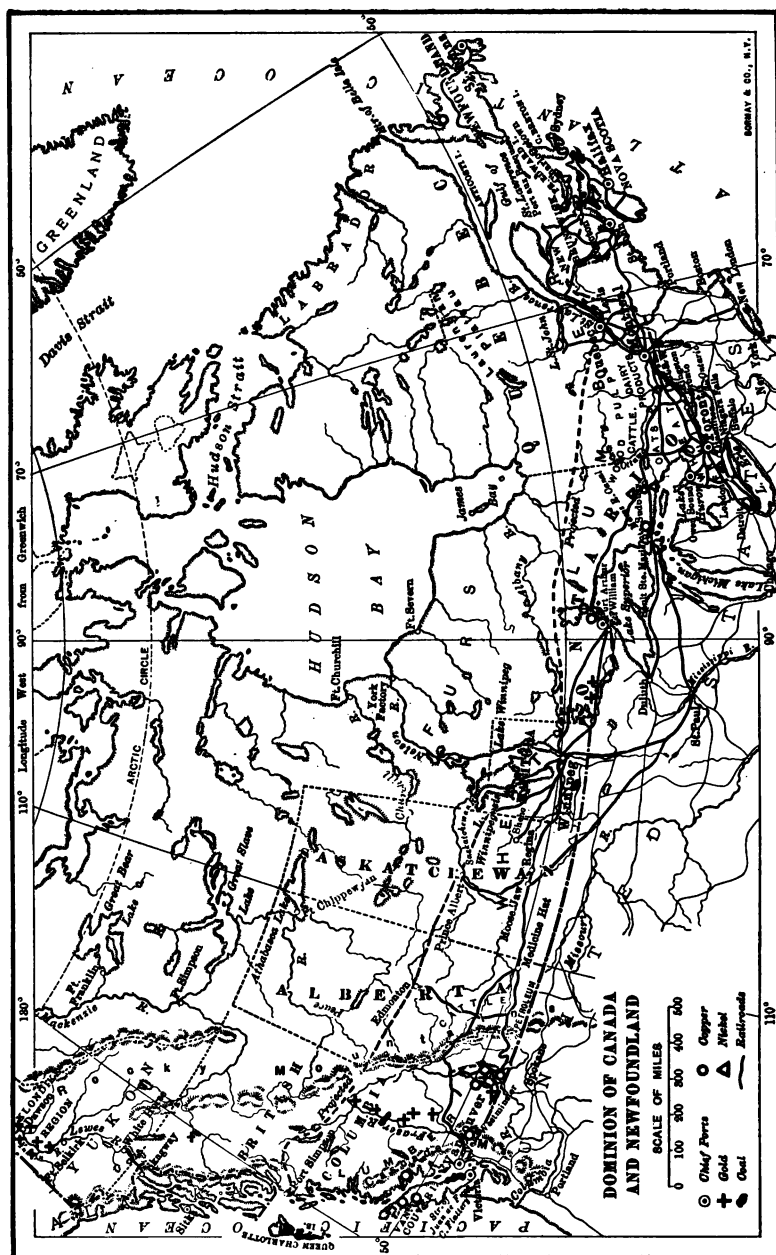
ALASKA

Area, 591,000 square miles. Population, 64,000

Location and Surface. — Alaska, a territory of the United States, occupies the extreme northwestern part of North America, and extends south along the island-studded coast to latitude $54^{\circ} 40'$ N. The Bering Sea coast consists mostly of low, flat plains, drained principally by the Yukon, one of the large rivers of the world. Its length has been estimated at about 2000 miles, and it drains most of the interior of the territory. Along the valley of this river the lowlands extend from the western coast to the eastern boundaries of the country. South of the Yukon valley the country is mountainous, being covered by extensions of the Pacific Mountain system of North America, which here reaches its greatest altitude in Mount McKinley, 20,464 feet high.

The southern coast line is deeply indented, especially on the west and south, and abounds in islands forming Alexander Archipelago.

Climate. — Near the southern coast the climate is generally equable; the summers being cooler and the winters warmer than in corresponding latitudes on the eastern coast of the continent. Fogs and rains are frequent, the rainfall of the coast reaching, at Sitka, as high as eighty-five inches. There is, however, little or no agriculture, because of the lack of level land and the coolness of the summers. In the interior there are hot summers, followed by long, intensely cold winters, and the rainfall is light.



Natural Resources. — The natural resources are varied and valuable. The furs, especially those of the fur seal and the sea otter, are of great value. The Pribilof Islands, in Bering Sea, are the principal breeding grounds of the fur seal.

Fish, which form the principal food of the inhabitants, are very abundant in the rivers, as well as off the coast. The salmon are the most important, ascending the rivers in myriads during the breeding season. Halibut, herring, codfish, and mackerel are caught off the coast.

The mineral resources, although as yet but partly developed, are apparently very rich. Gold occurs in considerable quantities, so that gold mining is the main industry of the white inhabitants of the territory. On Cape Nome and Douglas Island the deposits are very valuable. Valuable placer deposits occur in the famous Klondike region situated in Canada near the eastern borderland of Alaska. Large deposits of coal and copper have also been found.

Forests cover most of the country south of the Arctic circle.

THE DOMINION OF CANADA

Area, 3,756,000 square miles. Population, 5,375,000

Canada includes all of North America north of the United States except Alaska, Newfoundland, Labrador, Greenland, and Iceland.

There are nine provinces; viz., Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. These include about one half of the area, and nearly all the people; yet even in the provinces the average density of population is less than four to the square mile. The chief wealth of the vast and thinly settled territory north of the provinces is derived from the fur trade, except in the extreme west, where gold mining has become an important industry.

Canada is a colony of Great Britain, having a responsible government which somewhat resembles that of the United States,

except that the governor general, representing the crown, is appointed by the government of Great Britain, and the senators are appointed for life by the governor general.

Surface Structure. — The highlands and the lowlands have the same relative arrangement as in the United States, — a high plateau and mountain ranges on the west, and a lower plateau on the east, with a great low central plain between them. Nova Scotia and northern New Brunswick are traversed by mountains, and the eastern part of Quebec is crossed by the Laurentian Plateau and low mountains. West of this lies the Great Central Plain, which rises toward the west to an altitude of from 2000 to 5000 feet at the foot of the Rocky Mountains. The mountain system lies almost entirely in the province of British Columbia. The extreme northern part of the country is composed of tundra.

Climate. — The climate shows great differences in various regions, but on the whole is characterized by warm summers and long, cold winters. Although ice and snow cover the ground for from five to seven months of the year, yet in the southern part of Canada the growing season is sufficiently long to admit of farming. Though the winters are cold, yet, at Montreal, the summers are as warm as in many subtropical countries. In the south and east there is a moderate rainfall which is sufficient for wheat and many other crops, and which serves to supply almost innumerable lakes and streams, used throughout the unsettled part of the country as highways. As in the United States, there is an arid region east of the high mountains of the west. In portions of this dry region, however, great cattle ranches have been established, and in some parts irrigation has been successfully practiced as in the corresponding districts in the United States.

Natural Resources. — The Dominion of Canada possesses, next to Russia, the greatest forest area in the world. A subarctic forest belt extends across the central part of the country from east to west, with a width varying from 200 to 300 miles. Here are enormous quantities of spruce and poplar, suitable for wood

pulp, which only need facilities for transportation to make them extremely valuable. On the east and south of this district are extensive regions of pine, spruce, poplar, and hard woods. In New Brunswick, pine, spruce, maple, beech, birch, ash, and elm are the principal forest trees. Ottawa, in Ontario, is a great center of the lumber industry. Immense numbers of logs are floated down the Ottawa to the Chaudière Falls. Deseronto, on Lake Ontario, and Quebec, on the St. Lawrence, are also great lumber centers in Canada. At the latter place oak, maple, elm, and other hard woods are the principal products. In British Columbia are valuable forests of fir, cedar, and spruce.

Agriculture. — The principal occupation of the people is agriculture. Nearly three fourths of the inhabitants of Canada are farmers. A large proportion of the area of the country in the south is capable of being cultivated, and much wheat is raised on the prairies of Manitoba and Saskatchewan. The agricultural crops in the eastern provinces are oats, apples, and potatoes. Barley, oats, rye, and other hardy grains are raised in the north. Indian corn is raised in Ontario.

The district near the Great Lakes in the southern part of Ontario is very fertile. Fruits, especially apples, are raised in great quantities, and form an important article of export. There are also extensive vineyards.

Stock Raising. — Large numbers of cattle, sheep, swine, and horses are raised in Ontario and other parts of Canada. Dairy farms are numerous, and produce large quantities of cheese, most of which is exported to Great Britain. Chickens and turkeys are raised in great numbers, and form important articles of export.

Fisheries are extensive, those on the Atlantic coast being of the greatest importance. Cod, haddock, mackerel, herring, and lobsters occur there in great numbers. In the west, in British Columbia, the most valuable fish are the salmon, large quantities of which are canned in the extensive canning establishments on the Fraser River. From the Great Lakes and the many smaller lakes, large quantities of whitefish, trout,

sturgeon, bass, pike, and pickerel are taken. The Department of Marine and Fisheries of the Canadian government has established fish hatcheries for restocking the lakes and streams.

Furs. — Canada is one of the largest producers of furs in the world. This business is conducted by the Hudson Bay Company, which has its principal North American office at Winnipeg, and the furs and skins are mostly exported to London. The principal pelts are those of the beaver, otter, mink, marten, lynx, bear, and muskrat.

Mineral Products. — These are extensive and valuable. Gold is found in several localities, the most famous being the Klondike district, on the Yukon, and the Kootenay region in British Columbia.

Bituminous coal, which exists in considerable quantities in various parts of the country, is mined in Nova Scotia and Cape Breton in the east and on Vancouver Island in the west, whence it is exported to Washington, Oregon, and California. A little anthracite coal is found in Alberta, near the Rocky Mountains, and on the Queen Charlotte islands. Valuable deposits of iron occur in Nova Scotia and in various other parts of Canada. Nickel exists in large quantities in Ontario, Canada supplying about one half the world's product. Extensive deposits of copper are found in the neighborhood of Lake Superior, and in various parts of British Columbia.

Manufactures. — Canada has made considerable advance in manufactures during the past few decades. The sawing of lumber and the making of cheese and butter are extensive industries. The coarser varieties of textiles, both cotton and woolen, are produced in quantities sufficient to allow of export. The manufactures of iron and steel, owing to the bounty offered by the government, are also increasing.

Transportation Facilities. — The St. Lawrence and the Great Lakes afford a magnificent waterway. It is closed to navigation by ice during the winter, however, which greatly decreases its value to commerce. The government has expended immense sums of money in the construction of canals at those points

where rapids interfere with navigation, so that boats drawing fourteen feet can pass from the head of Lake Superior to the mouth of the St. Lawrence — a distance of 2384 miles.

Numerous railroads afford transportation routes that connect various parts of Canada with one another and with the United States. The principal of these are: (1) The Canadian Pacific system, which, besides its main line of 2900 miles across the continent from Montreal to Vancouver, owns or controls in addition about 5700 miles of railroad; and (2) the Grand Trunk system, which owns or controls about 4200 miles, extending from Levis opposite Quebec, Portland, Me., and New London, Conn., to Montreal and thence westward to Detroit and Chicago.

Commerce. — The foreign commerce of Canada is chiefly (87%) with the United States and Great Britain, the exports going largely to Great Britain and the imports coming largely from the United States.

The most important exports of Canada are wood and wood manufactures, including wood pulp (17%); cheese and butter (14%), chiefly from Ontario; wheat and wheat flour (13%), from Manitoba, Ontario, Saskatchewan, and Alberta; bacon and cattle (12%), largely from Ontario; gold-bearing quartz (7%), chiefly from British Columbia; and fish (4%), — cod, lobsters, and mackerel chiefly from Nova Scotia, and salmon chiefly from British Columbia. The most important imports are iron and steel manufactures (18%), textiles (cotton, wool, silk, and flax), chiefly manufactured (16%), coal and coke (7%), sugar and molasses (3%), and drugs and chemicals (3%).

The principal commercial cities of the Dominion of Canada are Montreal, Toronto, and Quebec, which command the trade of the Great Lakes and the St. Lawrence. Winnipeg, on the line of the Canadian Pacific, is the great grain center; and Victoria and Vancouver are the great cities of the west. Fort William on Lake Superior, and Owen Sound on Georgian Bay, Lake Huron, are the principal ports for the shipment of the western grain. Halifax in Nova Scotia, and St. John in New Brunswick, are also important ports.

The English language is generally spoken ; French is spoken in the province of Quebec. In the Federal Parliament both French and English are spoken, and both languages are used in all public documents and official reports.

NEWFOUNDLAND

Area, 42,700 square miles. Population, 217,000. Density, 5

Newfoundland, including **Labrador**, is a colony of Great Britain, but has no connection with Canada. There is some good farming land, but since the climate is cool and moist, farming is not generally pursued and fishing is the chief industry of the inhabitants. Newfoundland exports dried codfish, iron and copper ores, cod-liver oil, canned lobsters, and sealskins. Her principal imports are food and cloth, from Canada, the United States, and Great Britain.

DANISH AMERICA

Area, 878,000 square miles. Population, 91,000

Greenland and **Iceland**, together with the **Faroe Islands**, the latter being in the Atlantic Ocean midway between Iceland and Norway, belong to Denmark.

Greenland is deeply covered with glacial ice, except near the southwestern coast, where there are a few Eskimo settlements under Danish government. Cryolite, a mineral product, used as a source of aluminium and soda, is found at Ivigtut.

Furs, eider down, seal oil, and cryolite are the principal exports. The trade is mainly with Denmark.

The principal industries of Iceland and the Faroe Islands are sheep raising, fishing, and the collection of eider down and eggs.

The population of Iceland is about 80,000, or about two to every square mile. *Reikiavik*, on the southwestern coast, is the chief port.

CHAPTER XIX

MEXICO, CENTRAL AMERICA, AND THE WEST INDIES

MEXICO

Area, 767,000 square miles. Population, 13,600,000. Density, 18

Surface and Climate.—Mexico, lying south of the United States, may be divided into three parts, *i.e.*, the “*tierra*



FIG. 125. — Mexico — Chief Cities and Routes.

caliente,” or hot lands, which include the lowlands near the coast; the “*tierra templada*,” or temperate lands, including

much of the central plateau, where the elevation ranges from three to seven thousand feet, and the climate in general is sub-tropical; and the "*tierra fria*," or the cold lands, including the high mountain ranges.

Most of the people live in the temperate regions. In the northern part of the country the four seasons of the year are recognized; but south of 28° N. lat. there are only two, the wet and the dry. The wet season extends from May to November, though the rainfall is scanty in the interior, since the winds are drained of their moisture in crossing the bordering mountain ranges. Hence irrigation is necessary for agriculture.

The coast is regular in outline. There are no good harbors on the eastern coast, *Vera Cruz* and *Tampico*, the best, being very poor. This is unfortunate for commerce, since this coast is nearest to the principal commercial countries of the world. This coast is subject to terrific gales from the Gulf, and is fringed with sand bars and shoals that render navigation dangerous. On the western coast the harbors are better, those of *Guaymas* and *Mazatlan* being fairly good and that of *Acapulco* excellent. They have, however, little means of communication with the high interior plateau.

Natural Resources. — Mexico is one of the richest silver-producing countries in the world, ranking nearly equal to the United States in the production of this metal. Chihuahua, Durango, Guanajuato, Zacatecas, and San Luis Potosi are in the silver districts, Guanajuato being a smelting center. Large quantities of gold, copper, and lead are found in various parts of the country. Excellent sulphur is obtained from Mt. Popocatepetl. Coal and petroleum also occur in the country, but neither of these has as yet been developed.

Valuable forests of mahogany, rosewood, and logwood occur on the low moist lands of the coast.

Pearls are obtained from pearl oysters found in the Gulf of California. The oyster shells, from which mother-of-pearl is obtained, are a valuable article of export.

Industries.—Next to mining, agriculture is the most important industry, and the wide difference of climate permits an extended range of agricultural products. The principal crops on the plateau are Indian corn, wheat, barley, and rice, and on the lowlands, cotton, rubber, coffee, cacao, sugar, henequin, or the sisal fiber (produced chiefly in northern Yucatan), tobacco, and various tropical fruits. On the greater part of the land, especially on the plateau, irrigation is necessary. Excellent vanilla beans are grown on the coast of Vera Cruz.

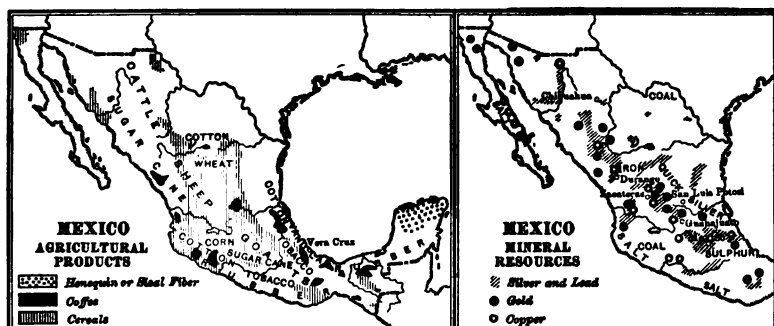


FIG. 126. — Mexico — Chief Products.

Animal raising forms an important branch of industry for many of the people. Cattle, sheep, and goats are raised in great numbers, both for their flesh and hides, though the sheep produce a coarse and inferior quality of wool. The large estates, or *haciendas*, correspond somewhat to our ranches. Dairy farming is practiced to some extent near the principal cities.

Mexico contains but few manufactures. There are a number of cotton mills that consume the cotton raised in the country, and, in addition, import some from Texas. Woolen mills consume some of the wool raised in the country. Paper, porcelain, chocolate, and glass are the only other manufactures of importance.

Transportation Facilities and Commerce.—There are no rivers suitable for extended navigation, so that the internal commerce is practically limited to the railroads. Of these there is, however, a fairly extended system. The more important lines are

the Mexican National, extending south from Laredo; the Mexican Central, extending from El Paso, Texas, and roads that connect the gulf ports of Tampico and Vera Cruz with the City of Mexico. Besides these, the Tehuantepec Railroad connects the Gulf with the western coast.

The exports of Mexico are more than twice as great as the imports. The principal exports are silver (40%), copper (10%), gold and lead; henequin (16%), coffee, vanilla beans, tobacco, and various woods from the lowlands; hides, etc., from the cattle regions. Nearly one half of the import and about two thirds of the export trade is with the United States. The remainder is with England, Germany, France, and Spain. The chief imports are iron, steel, and coal (30%), machinery, and textiles.

Principal Cities. — Mexico, the capital of the country, is the commercial center of the home trade. Puebla is a large manufacturing center. Guadalajara is noted for its potteries and its textile manufactures of cotton and woolen goods. *Vera Cruz* and *Tampico* are the principal ports. Most of the exports are shipped from Vera Cruz, which has regular connection with New York, New Orleans, Havana, and France. *La Paz*, on the Pacific coast, exports fruit, and *Manzanillo*, the coffee, sugar, and cotton of the neighboring plantations.

Spanish is the language of the country.

CENTRAL AMERICA

Area, 206,000 square miles. Population, 4,136,000. Density, 20

Central America, lying southeast of Mexico, includes the republics of Guatemala, Costa Rica, Nicaragua, Honduras, Salvador, and Panama, and the British colony of Belize, or British Honduras.

Surface Structure. — The Caribbean coast is low and flat. On account of the trade winds there is a heavy rainfall in this part of the country, and the eastern coast is covered with great forests. The interior is a plateau, having active volcanoes and mountain ranges near the Pacific coast, so that the strip of

coast plain on the west is quite narrow. The general elevation of the country is lower than that of Mexico, the climate, as in Mexico, varying with the elevation.

Most of the people live on the narrow coast plain that extends between the high mountains and the Pacific, the dense tropical forests of the eastern coast being unfit for habitation by white men. These forests, however, are rich in valuable timber and in rubber trees.



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FIG. 128. — Excavations in the Culebra Cut.

In the interior of Nicaragua there is a depression occupied by two large lakes, Managua and Nicaragua. It was at one time proposed to utilize the latter in constructing an interoceanic ship canal from Greytown on the Caribbean Sea to Brito on the Pacific.

Some of the rivers that drain the Atlantic slopes are navigable for short distances, and a few railroads have been constructed from the ports to some of the districts where coffee is raised.

Industries and Commerce.— *Guatemala* and *Salvador* are the most populous of the several republics. In both of them agriculture is extensively carried on, and in both the value of the exports is greater than that of the imports. Coffee is the most important crop, especially in Guatemala, where its quality is especially fine. Coffee, rubber, tobacco, and indigo are the principal exports. Guatemala imports most of its goods from the United States.

Salvador, with 123 people to the square mile, is more densely populated than any other of the Central American republics. It exports a product called the balsam of Peru, also indigo, coffee, and sugar, the latter being the most important.

Honduras contains valuable forests. Its principal exports are bananas, mahogany, and lignum-vitæ.

Costa Rica is very hot and moist, but is well adapted to the raising of tropical fruits. Its forests yield mahogany, cedar, and rosewood, together with many medicinal plants, such as sarsaparilla, ginger, rhubarb, and licorice. It has a larger foreign trade than any other Central American state. The chief exports are coffee and bananas; the chief imports are breadstuffs, textiles, and hardware.

Panama, a former department of Colombia, seceded from that country and became an independent republic, virtually under protection of the United States, in 1903. It occupies the narrowest part of the American continent, and at the Isthmus of Panama is but 37 miles wide from ocean to ocean.

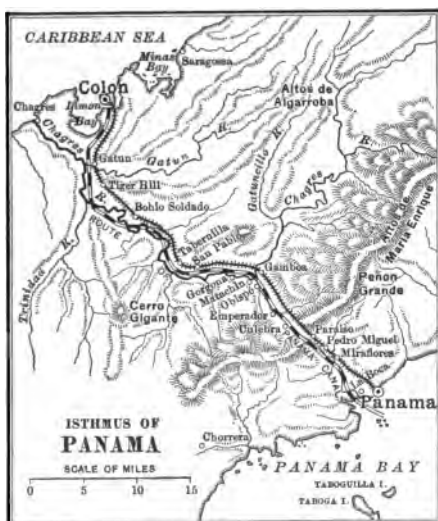


FIG. 129.—Isthmus of Panama—Chief Cities and Routes.

The country is of commercial interest because it contains the route of the Panama Interoceanic Ship Canal, the acquirement of which by the United States in November, 1903, gave assurance that the canal will be completed in the near future. There is already a railroad across the isthmus from *Colon* on the Atlantic coast to *Panama* on the Pacific, over which about 350,000 tons of freight are transshipped annually, and which has made these the most important ports in Central America.

The soil of Panama is very fertile, but most of it is uncultivated. Bananas are the most important export. Some attention is paid to collecting india rubber and raising coffee.

Spanish is the language spoken in all Central America.

THE WEST INDIES

Area, 91,631 square miles. Population, 6,296,000. Density, 69

The West Indies include a group of islands that extend from the entrance of the Gulf of Mexico between Yucatan and Florida in a general easterly direction, through nearly 25° of longitude, at which point they curve abruptly toward the coast of South America. The larger of these islands, viz., Cuba, Haiti, Jamaica, and Porto Rico, lie in the western part of the chain and are called the Greater Antilles. The more numerous islands in the eastern part of the chain constitute a group known generally as the Lesser Antilles. The entire chain of the West Indies have the Atlantic Ocean on the north and east, and the Caribbean Sea on the south.

REPUBLIC OF CUBA

Area, 44,000 square miles. Population, 1,570,000. Density, 36

Location and Surface. — Cuba, the largest and most important of the West Indies, lies 140 miles south of the mainland of Florida, and is nearly 800 miles long, with an average width of about 50 miles. Two thirds of the people are white, and the remainder, negroes. The southern coast is mostly low and marshy. Near the eastern end, however, a high mountain range rises from

the shore. On the north the shore rises abruptly from the ocean to an altitude of 250 feet, with many coral islands bordering it. Mountain ranges traverse the eastern and western parts of the island, while the middle is chiefly rolling plains. The rivers are short and practically without value for navigation.



FIG. 130. — Cuba — Chief Cities, Routes, and Products.

Climate. — The climate is hot, with very little difference of temperature throughout the year. The mean annual temperature of the coast is about 77° F., while the greatest difference between the hot and cold seasons is only about 32°.

The prevailing winds are from the northeast; the island is subject to tropical hurricanes, some of which cause great destruction. The rainfall is ample for agricultural purposes. About two thirds of the total precipitation occurs between May and October.

Natural Resources. — The soil is rich and needs practically no fertilization. The products of the island consist mainly of sugar, tobacco, and cacao. Cuba furnishes about one fifth of the world supply of cane sugar, producing about as much as Java, its greatest competitor. Nearly the entire center of the island is one vast sugar-cane field. Most of the crop is converted into raw sugar and exported. Coffee can be raised on the island, but not so as to compete with that raised in Brazil.

A very fine quality of tobacco for cigars is raised in the province of Pinar del Rio, in the western part of the island.

Tropical fruits are raised in large quantities, but mainly for home consumption.

Extensive and valuable forests, containing such woods as mahogany, lignum-vitæ, logwood, and cedar, cover portions of the island.

The mineral resources, though as yet undeveloped, include some valuable deposits of iron, copper, and asphaltum.

Commerce. — The means of communication between different parts of the island are rapidly being improved. While the wagon roads are poor, the railroad system is being extended, and now stretches nearly the length of the island. There are nearly 1500 miles of railroad.

Cuba has many excellent harbors, the chief of these being *Havana*, *Matanzas*, *Cienfuegos*, *Santiago*, and *Guantanamo*. There is but little commerce with neighboring islands, but there is much foreign trade in sugar, molasses, and tobacco. The United States supplies about three sevenths of the imports, and takes nearly three fourths of the exports, which consist mainly of sugar, tobacco, and iron ore.

The imports consist chiefly of breadstuffs, meats, rice, salt fish, coal, and manufactured articles from the United States and Great Britain.

THE REPUBLICS OF HAITI AND SANTO DOMINGO

Area, 29,800 square miles. Population, 1,700,000. Density, 57

The Island of Haiti, lying between Cuba and Porto Rico, is occupied by two weak and poorly governed negro republics. The republic of Haiti, which covers the western third of the island, has three fourths of the population, and is more important than the republic of Santo Domingo which occupies the remainder of the island. The island is traversed by several mountain chains, between which there are valleys with fertile soil. Agriculture is the principal industry. Coffee, cacao, logwood, mahogany, and leguminostas or gaiac wood are the prin-

cipal exports. The imports consist of flour, kerosene, and cotton textiles, mainly from the United States. *Port au Prince*, the capital, *Cape Haitien* on the northern coast, and *Aux Cayes* are the important ports of Haiti.

Santo Domingo on the southern coast and *Puerto Plata* on the northern coast are the important towns of Santo Domingo.

French is spoken in Haiti, and Spanish in Santo Domingo.

PORTO RICO

Area, 3600 square miles. Population, 953,000. Density, 265

Porto Rico belongs to the United States, and lies east of Haiti. It is mountainous in the center and low near the coast. It has a warm, moist, tropical climate, with prevailing trade winds, from the northeast. About one third of the inhabitants are negroes.

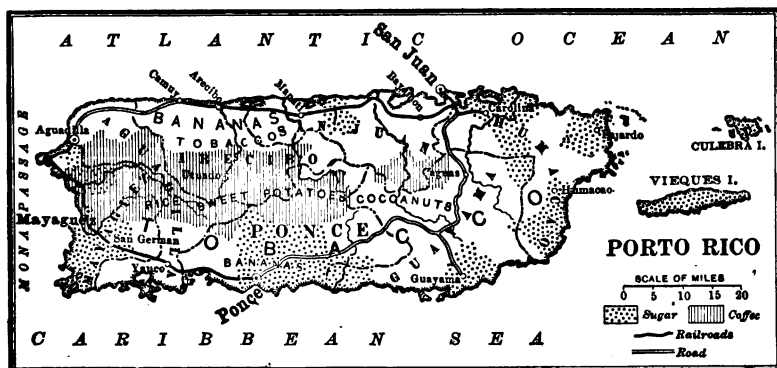


FIG. 131. — Porto Rico — Chief Cities, Routes, and Products.

The principal agricultural products are coffee, sugar, and tobacco. Cotton and rice are also raised. Tropical fruits are cultivated in great quantities, but are mainly consumed on the island. The roads in general are in bad condition. Railroads are now in process of construction.

The island exports chiefly to the United States and France, about two thirds of the trade coming to the United States. The principal article exported is sugar.

The principal cities are *San Juan*, *Ponce*, and *Mayaguez*.

BRITISH WEST INDIES

Area, 12,000 square miles. Population, 1,650,000. Density, 137

The **British West Indies** include six groups of islands: the Bahamas, Jamaica including Turks Islands, Barbados, the Leeward Islands, Trinidad and Tobago, and the Windward Islands.

The Bahamas. — The Bahamas lie north of Cuba. They consist of a group of low coral islands, of which New Providence, containing *Nassau*, the capital, is the most populous. Sponge fishing and the production of salt from sea water are the principal industries; but the raising of tropical fruits and sisal hemp is receiving much attention. Most of the trade is with the United States.

Jamaica is the largest of the British West Indies. It lies about 90 miles south of Cuba and 100 miles west of Haiti. It has a length of about 150 miles and a width of 50 miles. The soil is generally fertile, and agriculture is extensively practiced. The chief productions and exports are sugar, bananas, coconuts, rum, coffee, ginger, allspice, and cacao. The trade is chiefly with the United States and Great Britain. Turks and Caicos islands, of the Bahama group, form a dependency under this colony.

The Leeward Islands lie east of Porto Rico, and include a number of small islands, of which the more important are Antigua, St. Christopher (St. Kitts), Nevis, Dominica, Montserrat, and the Virgin Islands. The principal products are sugar and molasses.

The Windward Islands comprise Grenada, St. Vincent, the Grenadines, and St. Lucia. They lie between 12° and 14° N. lat., and form the eastern boundary of the Caribbean Sea.

The cultivation of the sugar cane, cocoa, cotton, coffee, and spice is carried on.

Barbados lies east of the Windward Islands. It stands high among the British West Indies in the production of sugar cane, nearly one third of the arable land being devoted to this industry. Much sugar is exported.

Trinidad, near the mouth of the Orinoco River, is famous for its great lake of asphalt, which furnishes an important article of export, largely used for paving streets. Cacao and sugar, however, are the chief articles of export. On the island of Tobago, which lies north of Trinidad, and is a dependency of that colony, cotton and tobacco are cultivated.

Commerce of the British West Indies.—The total foreign commerce of these groups has a value of about \$60,000,000, of which Trinidad and Jamaica contribute about three fourths. The imports, mainly textiles, flour, fish, rice, machinery, and hardware, are slightly in excess of the exports. The chief exports are sugar, cocoa, rum, logwood, pineapples, and spice. The principal trade is with Great Britain, the United States, and Canada.

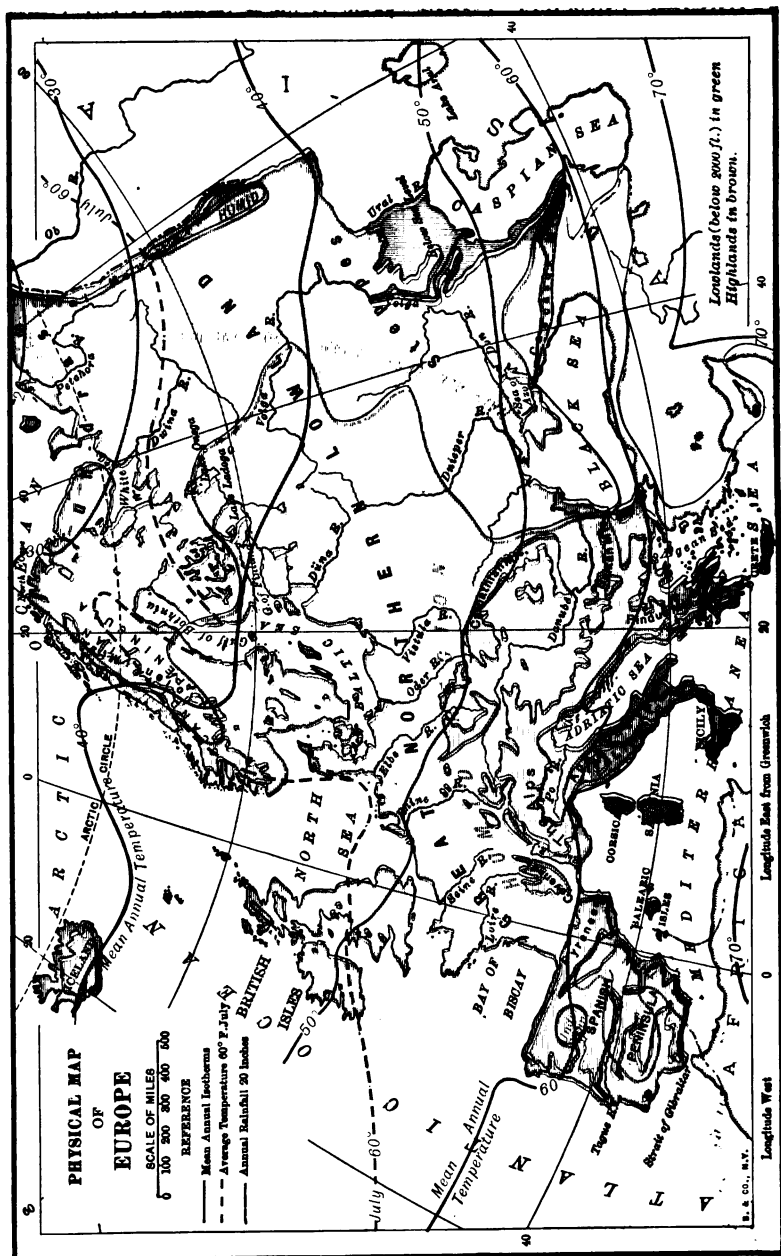
OTHER WEST INDIES AND THE BERMUDAS

The Danish West Indies, including the islands of St. Croix, St. Thomas, and St. John, are chiefly engaged in the cultivation of the sugar cane. The principal export is sugar; the principal imports are cotton goods and coal. The islands are inhabited mainly by free negroes who work on the sugar plantations.

The French West Indies include Martinique and Guadeloupe. The total foreign commerce amounts to about \$17,000,000, and is chiefly with France. The exports include sugar, coffee, cocoa, rum, tobacco, and cotton.

The Dutch West Indies include Curaçao, a colony embracing that island, Oruba, and Buen Ayre, with several smaller islands, which lie off the coast of Venezuela.

The Bermudas, a British colony and naval station, lie in the Atlantic about 580 miles east of North Carolina. They are the most northern coral islands in the world. They have a warm, mild climate. Lines of steamers run regularly to New York and Halifax. The chief exports are onions, potatoes, lilies, and other plants, nearly all of which are shipped to New York. More than half the imports come from the United States. *Hamilton* is the chief city and port.



CHAPTER XX

EUROPE. GREAT BRITAIN AND IRELAND

EUROPE

Area, 3,842,000 square miles. Population, 396,406,000. Density, 103

Surface. — The great mountains of Europe lie in the southern part, where the plateau and ranges of the Spanish peninsula, the Cevennes of France, the Apennines of Italy, the Alps with their northwestern outliers, the Carpathians inclosing Austria-Hungary, and their southeastern continuations ending in the Pindus Mountains of Greece and the Balkan Mountains of Turkey, form an almost continuous highland from the Strait of Gibraltar to the Black Sea, a distance of 2000 miles. Farther east the lofty Caucasus Mountains carry the southern highland from the Sea of Azof to the Caspian Sea. The only other highlands are formed by the gradual swell of the Ural Mountains on the eastern border of the grand division, and the somewhat higher Kiolen Mountains, which rise abruptly from the Atlantic coast of Norway and slope gradually off to the eastward. The highlands of northern and western Great Britain are an outlier of this northwestern highland.

Between the southern, eastern, and northwestern highlands the surface of Europe is a vast lowland plain, extending nearly 3000 miles from the Bay of Biscay to the Urals. In the west, where it includes southeastern England and northern France and Germany, the plain is only a few hundred miles wide, but it expands toward the east, and in Russia occupies the whole width of the grand division from the Black Sea to the Arctic Ocean, a

distance of 1800 miles. The northern part of this plain, like that of the central lowland of North America, is covered with glacial deposits and dotted with many glacial lakes, and as a whole is characterized by the faintness and smoothness of its relief. At but few points does it reach an elevation of 1000 feet, while a considerable area north of the Caspian Sea, and smaller areas near the North Sea, are actually below the level of the ocean. In Fig. 132 the green represents lowlands and the brown, highlands.

The main divide of Europe extends southwest from the Urals across the low plain to the Carpathians and thence in the southern highland to the Strait of Gibraltar. The larger rivers — the Volga, Don, Dnieper, and Danube — lie south of the divide. The Danube basin lies between the northeastern and southeastern arms of the Alpine highland, and includes the broad and fertile lowland plain of Hungary. The much smaller southern rivers, the Po and the Rhone, also have valleys of notable fertility.

North of the divide the principal rivers are the Loire, Seine, Rhine, Elbe, Oder, Vistula, Düna, and Dwina. All of these as well as the rivers of the southern slope are navigable, and nearly all of them are connected by canals.

Climate. — Although practically all of Europe lies north of the latitude of Philadelphia, Indianapolis, and Denver, its climate as a whole is much more moderate and equable than that of eastern North America in corresponding latitudes. This marked difference is due chiefly to the fact that there is no high and continuous mountain wall, as in America, along the whole western coast of Europe. The prevailing westerly winds from the ocean thus sweep far inland and lose but gradually their moisture and their moderate and equable temperature.

The difference between winter and summer temperatures over the whole western half of Europe, as far east as the meridian from Cape North to Greece, is about the same as it is in our cotton states, while nowhere in the eastern half is the range of temperature greater than it is in the northern half of the United States. East of the Kiolen Mountains the July isotherm

of 60° lies in general much farther north than in eastern America, while even in winter the Mediterranean coast, protected from cold north winds by the southern highlands, is as warm as the semi-tropical Gulf coast of the United States.

The rainfall in the greater part of Europe is sufficient for agricultural purposes. It is heaviest in the west and on the northwestern and Alpine highlands (where it rains from forty to more than eighty inches annually), and decreases more or less rapidly toward the east, as indicated on the map by the line of twenty inches annual rainfall.

Near the western and southern coasts the greatest rainfall occurs in autumn and winter, but elsewhere, during the late spring and summer months. Thus even beyond the twenty-inch rainfall line in eastern Europe fine crops are raised, because the rains occur during the growing season. In southeastern Europe there is a large arid region of steppes and salt wastes north of the Caspian Sea, and in parts of Spain, Italy, and Greece the dry summers render agriculture precarious without irrigation.

Natural Resources. — A frozen tundra covers the extreme northern part of Russia. South of the tundra lie extensive forests of fir, spruce, and birch.

The central plain is the great food-producing region of Europe. Here are raised large crops of wheat, rye, oats, barley, and potatoes. Considerable flax and wool are also produced in this section of the country. South of the Alps grapes, olives, oranges, lemons, figs, almonds, and chestnuts are the staple crops.

The central plain contains beds of coal and iron ore. One or both of these minerals occur in large quantities in England, Belgium, and northern Germany. Fine iron ore and other metals are extensively mined in Spain, Scandinavia, and eastern Russia. In these regions manufacturing centers have been developed.

Commerce. — The population of Europe is about five times as great as that of the United States. Materials to feed and

clothe this dense population are not raised in sufficient quantities in many of the countries, and must be obtained from other parts of the world. Hence arises the enormous foreign commerce of Europe, which consists chiefly of the importation of food and raw materials and the exportation of manufactured products.

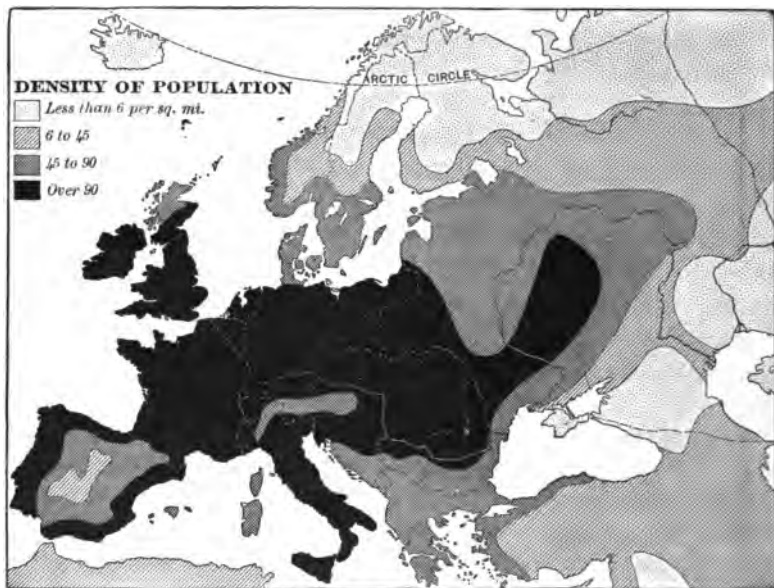


FIG. 133.

Commercial Facilities.—The great commerce of Europe is facilitated by its peculiarly indented coast, which gives nearly every country excellent seaports, as well as by the many navigable rivers and the extensive canal systems. Some of the canals connect the rivers of the northern and southern slopes through the low divides, thus affording cheap water routes entirely across the continent, between the northern and southern coasts. In addition a complete railway system has been developed in most of the countries, especially in central and western Europe (see Fig. 16, p. 60).

GREAT BRITAIN AND IRELAND

Area, 121,000 square miles. Population, 42,000,000. Density, 347

Location and Surface. — The United Kingdom of Great Britain and Ireland, sometimes called simply Great Britain, occupies the British Isles, lying northwest of the mainland of Europe, separated from it by the North Sea and the English Channel. It includes England, Scotland, Wales, Ireland, and the neighboring islands.

For three centuries Great Britain has been the leading commercial nation of the world. While the total amount of her foreign commerce is still unrivaled, yet her exports are now slightly exceeded by those of the United States. Until recently she has been the greatest manufacturing nation in the world, but she is now greatly surpassed in this respect by the United States. In agriculture she has, for many years, been unable to supply her people with the necessary food staples in sufficient quantity, or with the raw materials required for her manufactures.

Great Britain, however, is a great colonizer, and the comparatively few millions of people in the British Isles rule to-day over millions of square miles of territory and hundreds of millions of people; but in general wherever British domain has extended, there have been good government and prosperity.

The eastern part of England is level or slightly rolling. The northern and western parts and Wales are hilly. The northern part of Scotland is mountainous, the highest mountain peak, Ben Nevis, having an altitude of 4500 feet. Ireland is hilly in the north, low in the south, and rolling in the center.

The climate is equable and humid, with frequent fogs. Both temperature and rainfall are greater on the western than on the eastern coasts.

Natural Resources. — Of the natural resources, coal and iron are undoubtedly the most important, and while four independent districts are usually distinguished, they lie mainly in the central section of the island of Great Britain, between Bristol Channel



and the Humber and the Firths of Clyde and Forth in the north. Ireland has but little coal and iron, and both are of inferior quality.

The fisheries are also extremely valuable, and give occupation to about 100,000 men. Fishing towns are scattered all along the coast. Hull, Yarmouth, Lowestoft, Grimsby, and Harwich, on the eastern coast, and Dartmouth, on the southern coast, are the most important. The principal fishes taken are herring, haddock, shellfish, and cod.

Agriculture and Stock Raising.—Of the 77,000,000 acres in Great Britain and Ireland about 48 per cent are cultivated, 30 per cent are permanent grazing lands, and 22 per cent are either too rough for cultivation or pasturage or are occupied by woods, cities, roads, parks, or other permanent improvements. In general the hilly northern and western parts of Great Britain are rough, have a hard and gritty soil, and are better adapted for pasturage than for cultivation. The low plains of the southern and eastern parts of the island, however, are covered with a rich soil, formed by the decay of the underlying calcareous rocks, and this region embraces two thirds of the farming area of the kingdom.

Here large crops of wheat, barley, oats, rye, hops, peas, beans, and turnips are raised. Farming is carried on in a very scientific manner, the farms yielding larger crops to the acre than in any other country in the world. During recent years, however, less grain has been raised, since the increased facilities for commerce, together with the cheapness of production in the United States, have made it impossible to compete with the imported grain. Market gardening, however, has increased in value. In the lowlands of southern Scotland, as well as in the greater part of England, garden vegetables are now being raised in immense quantities. Ireland contains a large area of bog lands. A large acreage in Ireland is devoted to oats, potatoes, corn crops, and green crops. Flax is also an important crop, and linen constitutes the chief article manufactured in Ireland.

The soil of the British Isles is worked mostly by tenants who rent it for a long term of years from large landed proprietors. It was estimated not long ago that half the cultivated area of Scotland was owned by less than one hundred persons. The tenants are assisted by hired "hands," who receive the use of a cottage and a scanty wage. A large part of Ireland is owned by landlords who live in England. Since these rentals go to "absentee landlords," Ireland suffers greatly from the lack of ready capital.

On the whole, however, agriculture is much less important in the United Kingdom, especially in Great Britain, than either

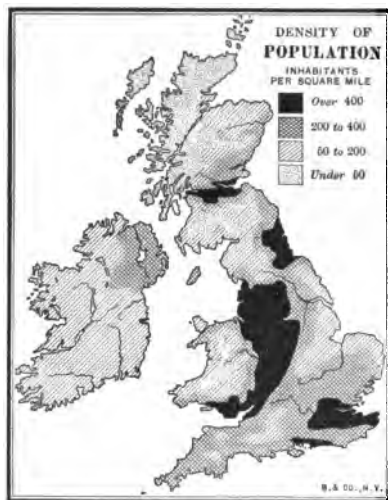


FIG. 135. — Density of Population of Great Britain and Ireland

manufacturing or commerce. More than two thirds of the population live in cities and towns, and those engaged in agriculture form but a small proportion of the workers of the country. The United Kingdom has a greater population, in proportion to the cultivable area, than any other nation in Europe. The distribution of the population is shown in the map.

The whole of the British Isles, except northern Scotland, afford an excellent pasturage, and much attention is paid to raising fine cattle and sheep, especially in the western part of England and all but the western part of Ireland. Great Britain is famous for its consumption of beef and mutton. It imports more than one third of all it consumes, but none of it is finer than that produced at home.

Policy of the Government. — Recognizing the fact that the prosperity of a country depends in a large measure upon manufactures and commerce, the British government has always shaped its

policy so as to promote both of these industries. Colonies have been planted in all parts of the world; military, naval, and coaling stations have been established; and an enormous navy has been supported. The British policy of free trade with other nations of the world has also worked to her advantage.

Skilled Labor. — In any country the amount of skilled labor that exists has a great influence on its manufactures and its commercial prosperity. In this respect Great Britain excels every other country in the world, with the single exception of the United States. The English people have, for many years, been acquiring knowledge of machinery and skill in its use.

Manufacture of Textiles. — The making of cloth, especially cottons, woollens, and linens, ranks as the most important branch of manufacture. The great centers for this industry are in the coal regions between Liverpool and Hull and in the neighborhood of Glasgow, where the moist climate is peculiarly favorable for the manufacture of the finer kinds of cotton goods. Manchester, at one time the center of the wool and linen industries, has now become the greatest cotton-manufacturing center in the world, while in many of the neighboring towns of Lancashire this industry is extensively carried on. Nottingham to the southeast is noted for its cotton laces and hosiery. Paisley in the Glasgow region is the chief center for the making of cotton thread.

Leeds, Bradford, and Leicester are the centers of the wool industries, Leeds for woollen cloth, Bradford for worsted goods, and Leicester for woollen hosiery. The wool manufactures are carried on in the southeastern part of Scotland, especially at Hawick, Jedburgh, Selkirk, and Dumfries, which are famous for the manufacture of tweeds, woollen hosiery, and carpets.

Manufactures of Iron and Steel. — The making of iron and steel articles of all kinds ranks as the next important manufacturing industry of Great Britain. The centers of these manufactures practically coincide with the regions of coal and iron in Yorkshire, in the northeastern part of England, in southern Wales, and in the region of the Clyde, in Scotland.

Birmingham, Sheffield, Newcastle, Glasgow, Middlesbrough, Barrow, and Darlington are the great centers of iron manufacture, although the regions all around them are well built up with towns having foundries of great size.

Birmingham has been engaged in the manufacture of iron since the sixteenth century. Steam engines and machinery are its principal products. Sheffield is noted for its cutlery. A part of the steel employed is obtained from a Swedish iron ore peculiarly well suited for cutlery, for which purpose it is expressly imported. Middlesbrough and Barrow manufacture steel rails. Glasgow makes marine engines, as well as iron and steel ships. Swansea, in Wales, has extensive smelting works, which receive shipments of ores from different countries of Europe, chiefly from Bilbao, Spain, nearly one third of the iron ore used in Great Britain being imported.

Worcester and Derby manufacture fine porcelain, and Burslem and Hanley earthenware goods. Leicester and Stafford are large manufacturers of shoes. Paper is made in western England.

Internal Transportation Facilities. — The rivers of the United Kingdom are short, yet many of them end in long, navigable estuaries, as the Forth, Ouse, Thames, Severn, Mersey, Clyde, and Shannon. Some of the rivers are navigable for light draft boats for a considerable distance inland. In many cases canals have been built, making it possible to obtain water communication between the eastern and western coasts of the country. For example, the ports of Goole and Hull, in the eastern part of England, have been connected with Liverpool and Preston on the west. The Trent and the Thames have each been connected with the Severn. The Firth of Forth and the Firth of Clyde have been joined by a canal. The same has been done for the Moray Firth and the Firth of Lorne. The Shannon, in Ireland, has been connected with both Belfast and Dublin by canals. All together there are nearly 4000 miles of canals, more than three fourths of which are in England. These internal waterways are of considerable commercial importance, but they transport less

than one tenth as much freight as is transported by the railroads.

The 23,000 miles of railway in Great Britain give it a complete system of intercommunication, — England and Wales having 26 miles of railway to each 100 square miles of area, a higher rate than any other country. London is the great railway center,



FIG. 136. — Bank of England, London.

and from it lines radiate to all the other seaports and industrial centers. Tramways are, however, not nearly so common as in the United States, the large cities, especially London, depending mainly on omnibus and carriage transportation.

Ocean Navigation. — The United Kingdom has a much larger merchant marine than any other nation (see Fig. 19, p. 65), and does a large part of the carrying trade of the world, both in passengers and in freight. More than one half of the commerce of the United States is carried in British ships, and nearly as much of the foreign trade of Italy, Russia, France, and Germany.

Commerce. — The foreign commerce of Great Britain is greater than that of any other nation (see Fig. 23, p. 80). The exports are about the same as those of the United States, but the imports are about twice as great.

The reasons for the commercial preëminence of Great Britain are many, but the chief one is that of absolute necessity; for in spite of a mild climate and a good soil, the small area, which limits the amount of agricultural products, the uniformity of climate, which limits their diversity, and the dense population make it necessary for her to import from other



FIG. 137. — Princes' Dock, Liverpool.

nations a large proportion of the necessary supply of food, as well as of the raw materials for the manufactures. To pay for the importations, manufactured goods of enormous value and of almost infinite variety are exported. The principal exports, however, are textiles, in the value of which Great Britain leads the world, and iron and steel, in the manufacture of which she is surpassed only by the United States. The prominence of Great Britain in manufacturing is largely due to the abundant supplies of coal and iron ore available in the island.

Great Britain produces less than one third of her wheat supply, importing the rest. Much of this and of her flour and meat and nearly all of her raw cotton are supplied by the United States. Of manufactured cotton goods about one fourth are used at home and three fourths are exported. About five sixths of the raw wool is imported (chiefly from Australia, New Zealand, South Africa, and Argentina), while but three fifths of the manufactured product is exported. The commerce of Ireland is chiefly with England and Scotland. The table shows the character and distribution of the foreign commerce. From this table graphic diagrams can easily be made by the pupil, on cross-section paper. (See Figs. 116 and 117, pp. 224 and 225.)

IMPORTS		EXPORTS	
Grain and Flour	13 %	Cotton (mfd.)	25 %
Meat and Animals	9	Iron and Steel (mfd.)	21
Cotton (raw)	8	Coal	9
Butter, Cheese, and Eggs	7	Wool (mfd.)	9
Textiles (mfd.)	7	Other Cloth	4
Lumber	5	Drugs, etc. (mfd.)	4
Oil Seeds, etc.	4	Apparel	3
Wool (raw)	4	Leather, etc.	2
Copper, Tin, Lead, Zinc	3	Ships	1
Sugar	3	Oil Seeds, Nuts, etc.	1
Tea and Coffee	2½	Earthenware and Glassware	1
	65½ %		80 %
FROM		To	
United States	24 %	British India	12 %
France	10	South Africa	9
Netherlands	7	United States	8
Germany	6	Germany	8
British India	5	Australia	7
Belgium	5	France	6
Russia	5	Canada and Newfoundland	4
Canada	4	Russia	3
Australia	4	Netherlands	3
Denmark, Iceland, and Greenland	3	Belgium	3
Sweden and Norway	3	Italy	2½
Spain	3	Sweden and Norway	2½
Argentina	2½	China	2½
	81½ %		70½ %

Chief Ports. — About 78 per cent of the foreign commerce is carried on through nine groups of seaports, which in the order of tonnage movement are : —

(1) *London* (18%), the greatest port in the kingdom, owes its prominence to its vast population and excellent facilities for distri-

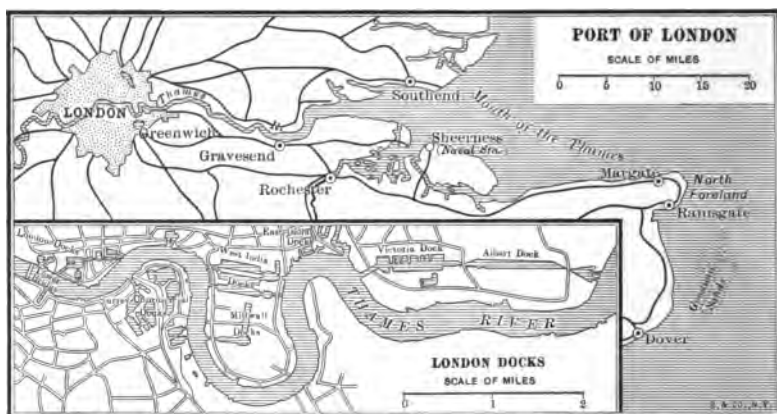


FIG. 138. — London and Vicinity.

bution inland. Imports form the great bulk of its foreign trade. London is the financial center of the world.

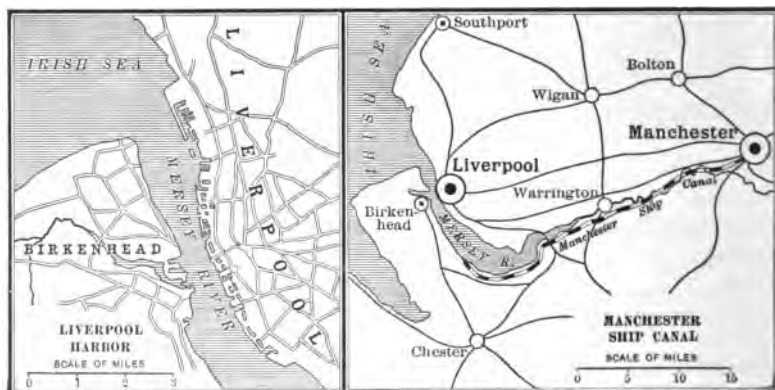


FIG. 139. — Liverpool and Manchester and Vicinity.

(2) *Liverpool* (13%, or, including Manchester, 15%), which enjoys the practical monopoly of American and West African

trade, imports food and raw materials, and exports textiles and machinery. The harbor is the Mersey estuary, which has been deepened and is kept open at great cost.

(3) *Cardiff* (13%), with a tonnage about equal to that of Liverpool, is chiefly a coal-exporting port for the coal mines of South Wales.

(4) *The Tyne ports* (8%—Newcastle, Gateshead, North Shields, and South Shields) export chiefly machinery and coal.

(5) *The Humber ports* (6%—Hull and Grimsby) trade chiefly with continental Europe, exporting textiles and importing continental produce.

(6) *The Forth ports* (6%—Leith, Grangemouth, and Kirkcaldy) export chiefly coal.

(7) *Newport* (5%), near the mouth of the Usk, about four miles north of the Severn, is a great exporting point for iron and coal.

(8) *Glasgow* (4%), with an artificial harbor on the Clyde, imports chiefly ore and raw materials and exports iron and manufactures.

(9) *Southampton* (3%) is an important passenger port for American and South African lines.

Colonies of Great Britain.—There are three different classes of British colonies, viz.:—

(1) The Crown Colonies, entirely controlled by the home government.

(2) Representative Colonies. Here the crown retains the control of the public officers and leaves the lawmaking to the legislative bodies, but retains a veto on legislation.

(3) Those having responsible governments, where the crown appoints the governor, but has no control over any public officer. Here the laws are made by legislative bodies, but the crown retains a veto on the legislation.

The total area under the jurisdiction of Great Britain is 11,000,000 square miles, having a population of 395,000,000, three fourths of which is in India.

The principal colonies or dependencies of Great Britain are British India, Ceylon, the Straits Settlements, and Hongkong in Asia; Cape Colony, Transvaal Colony, Orange River Colony, and Natal in Africa; Canada, Newfoundland, and Jamaica and other West Indies in America; and Australia and New Zealand in Oceania.

CHAPTER XXI

FRANCE

Area, 207,000 square miles. Population, 39,000,000. Density, 188

Location and Surface.—The republic of France extends from the English Channel to the Mediterranean, with the Bay of Bis-



FIG. 140. — France — Chief Cities, Routes, etc.

cay on the west, and Belgium, Germany, Switzerland, and Italy on the east. At the Strait of Dover the French coast is but twenty-one miles distant from England. Most of the northern part is a plain, but the south central part is occupied by a great central plateau, and the southern and eastern borders are mountainous, — the Pyrenees on the south, and the Alps, Jura, and Vosges on the east. The northwestern peninsulas are also rugged and rocky.

Between the Cevennes, which form the eastern escarpment of the central plateau, and the Alps is the valley of the Rhone. This valley with that of the Saone furnishes an easy trade route between the Mediterranean and the northern plain. From the Rhone valley through the "Burgundy Gate" communication is also had with the Rhine valley.

West of the central plateau is the plain of Aquitaine, connected with the northern plain, between the central plateau and the rugged uplands of Brittany.

Climate. — The climate is temperate. The winds from the Atlantic bring an abundance of rain, the fall being greater in the west than in the east. In the southern part of the country the summers are hot and rather dry. On the central plateau the winters are long and cold.

Agriculture and Stock Raising. — With the exception of some sandy tracts along the Bay of Biscay, and in the central plateau, the soil is highly productive and is most carefully cultivated. Since the entailing of estates was abolished by Napoleon, the land in France has been divided into many small farms, worked mainly by the farmers themselves. France contains as many farms as the United States, although the United States is nearly fifteen times as large as France and has six times as much cultivated land. The farms are carefully cultivated, and an excellent state of agriculture is the result. In the north and west central parts the soil is underlaid by calcareous deposits, which render it very fertile. Fifty-five per cent of the area of France is under cultivation.

The principal agricultural products of France are wheat,

oats, rye, barley, potatoes, the sugar beet, grapes, olives, the mulberry tree, and fruits of all kinds. Wheat is grown very generally over all parts of the area, only two other countries, the United States and Russia, producing a greater amount. The people, however, consume all that is raised, and in some years are even obliged to import a little.

As a wine-making nation France exceeds all others. The most famous of the French wines are champagnes and various red wines. Brandy is manufactured in large quantities. The reputation of French wines is so great that considerable foreign wine is imported to be exported again under French labels.



FIG. 141. — Picking Grapes for Wine, France.

The vineyards were, at one time, threatened with destruction by an insect pest known as the phylloxera ; but it has been nearly stamped out of existence.

France produces great quantities of sugar beets. The sugar is refined at Paris, Marseilles, Bordeaux, and Havre, and forms an article of export to Great Britain.

Lumber. Although about one fifth of the area of France is covered with forests of beech, pine, elm, and chestnut, yet there is not sufficient of the kinds required for building and cabinet purposes. These are, consequently, imported. Wood is the principal domestic fuel used in France.

Stock raising forms an important branch of industry, both for meat and for dairy products. Fine cheese is produced in various parts of the country, the celebrated Camembert and Neufchatel in Normandy, and Roquefort, made from ewes' milk, in the southeastern provinces. Many sheep are raised both for their flesh and for their wool.

Fisheries. — These are of great importance. The principal fishes are the cod, herring, and sardines. The latter are canned in great numbers and constitute an important article of commerce. The cultivation of the oyster has also come to be important, valuable oyster beds having been planted both in the Bay of Biscay and in the English Channel.

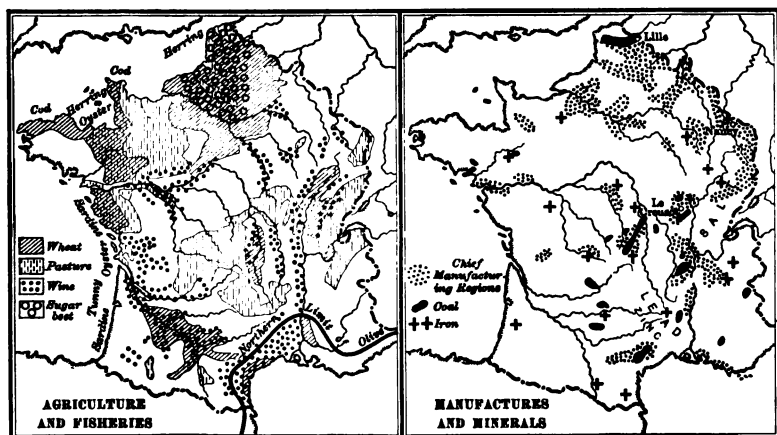


FIG. 142. — France — Chief Industries.

Minerals. — The principal mineral regions are shown in the map. The French mines, chiefly near the Belgium frontier and near St. Etienne, supply nearly three quarters of the coal used in France — the remainder is imported, chiefly from Great Britain.

Large quantities of iron and steel are made in the districts of *Lille*, *Nancy*, and *Le Creusot*. The iron deposits are richest near the German frontier. Salt is obtained from valuable

deposits near this frontier, as well as from the salt marshes on the western coast.

Manufactures. — The manufactures of France, although exceeded in amount by those of the United States, Great Britain, and Germany, are famous for their artistic excellence. This is due, in part at least, to the establishment of government industrial schools in various parts of the country, especially at Paris. On account of their fineness French manufactures find a ready sale in foreign markets. The manufacturing districts are shown in Fig. 142.

Textiles form the leading manufacture, affording employment for over a million people. France excels especially in the manufacture of silks, velvets, woolens, and linens. Lyons is the center of the silk and velvet industry, though St. Etienne, Tours, and Paris are noted for the manufacture of ribbons and other silk goods.

The centers of the woolen manufactures are at Roubaix, Rheims, and Amiens, in the neighborhood of the sheep-raising districts and the ports through which wool is imported.

The principal cotton and linen factories are located at Rouen and Lille, near the ports of entry for cotton and flax. At these points the manufacture of laces is extensively carried on. At Lille and Roubaix the famous Point d'Alençon lace is made.

The manufacture of fine leather and leather goods forms an important industry, especially of shoes and gloves. In addition to the above-mentioned articles, many others are made, such as perfumery, jewelry, bronzes, porcelain, etc., which command high prices by reason of their delicacy or beauty.

The government has a monopoly of the manufacture and sale of tobacco and matches, from which it derives a considerable revenue.

Transportation Facilities. — The principal rivers of France are the Seine, Loire, Garonne, Meuse, and Rhone. These, with a number of their tributaries, have been rendered navigable for steamboats or canal boats, and are much used in commerce.

In addition these streams are connected by canals, — the Rhone being thus connected with each of the streams mentioned and with the Moselle. France has in all about 7600 miles of navigable interior waterways.

France is famous for the excellence of its highroads. An extended system of about 28,000 miles of railway covers the country with a complete network. It connects *Paris*, the great financial, industrial, and commercial metropolis, with other industrial centers, and these with one another.

In spite of its long land frontier more than two thirds of the foreign commerce of France is sea-borne. The following are the chief ports, with the approximate percentage value of the total foreign commerce handled at each:—

Chief Ports. — *Marseilles* (19%) is the chief port of the country. It owes its preëminence to its position at the foot of the Rhone valley and canal communication between the Rhone and the rivers of the north. Its trade is carried on mainly with Mediterranean ports and with the East through the Suez Canal.

Havre (17%) is the chief port of trade with the United States and also with South America for cotton, wool, wheat, and tobacco.

Paris (8%), although 100 miles from the sea, has, since the deepening of the channel of the Seine, become the third port of the country in importance.

Bordeaux (5%) on the west coast deals largely in wine and fish exports. *Dunkirk* (6%), *Boulogne* (4%), *Dieppe* (3%), and *Calais* (3%) are also important ports.

Commerce. — France stands fourth in the nations of the world in the extent of its foreign commerce, being exceeded in this respect only by Great Britain, Germany, and the United States. The imports are a little in excess of the exports. The table on p. 278 shows the character and distribution of the foreign commerce. The imports from the United States consist of grain, meats, cotton, and petroleum; from Great Britain of coal, woollen goods, machinery, and iron.

IMPORTS		EXPORTS	
Silk (chiefly raw)	9%	Wool (raw and mfd.)	11%
Wool	9	Silk (chiefly mfd.)	11
Cotton	7	Wine	6
Coal	6	Smallware	5
Oil Seeds	5	Leather (mfd.)	4
Lumber	4	Cotton (mfd.)	4
Hides and Fur (raw)	4	Skins and Furs (mfd.)	3
Cereals	3	Linen (mfd.)	3
Wines	3	Metal Goods	2
Coffee	2	Chemicals	2
Ores	2	Cheese and Butter	2
Flax	2	Spirits	1
	<u>56%</u>		<u>54%</u>
FROM		TO	
Great Britain	13%	Great Britain	30%
United States	10	Belgium	15
Germany	10	Germany	11
Belgium	7	Algeria	6
Algeria	6	United States	6
Argentina	5	Switzerland	5
British India	5	Italy	4
Russia	5	Spain	3
China	4	French Indo-China	2
	<u>65%</u>		<u>82%</u>

The French language is universally employed.

Colonial Possessions of France. — The total area of the colonies, dependencies, etc., of France is about 4,000,000 square miles, and the total population is about 53,500,000. Including its colonies, protectorates, dependencies, and spheres of influence, France ranks next to Great Britain and Russia, among European powers, in the extent of territory and the number of people it controls or governs. The principal possessions embrace French India and Indo-China in Asia; Algeria, Tunis, and Madagascar in Africa; and French Guiana, Martinique, Guadeloupe, and dependencies in America.

CHAPTER XXII

BELGIUM AND THE NETHERLANDS

BELGIUM

Area, 11,400 square miles. Population, 6,700,000. Density, 587

Location and Surface. — The kingdom of Belgium northeast of France and south of the Netherlands has Germany on the east and 42 miles of North Sea coast on the northwest. It is the most densely populated nation in Europe, having more people than Pennsylvania, although only one fourth as large. The country is low and flat on the north and west, but in the southeast is the Ardennes plateau, with a height less than 2000 feet above the sea level.

Agriculture. — Although the soil is not especially adapted to agriculture, yet nearly two thirds of the country is under cultivation, and it is so intelligently cultivated that it yields great crops. Nevertheless, the density of population makes necessary the importation of much grain. The farms are small, very few of them exceeding five acres in size. The principal crops are rye, oats, wheat, potatoes, sugar beets, flax, hops, and various market garden products. The northwestern parts of the country are diked, and artificially drained, and afford fine pasturage, the raising of cattle and dairying being important industries. Eggs and poultry form important articles of commerce.

Forests. — About one sixteenth of the area of the kingdom is covered with forests. These are skillfully cared for by the government, and form a considerable source of revenue.

Manufactures. — Belgium has rich mines of coal, iron, zinc, silver, and lead in the Ardennes plateau. These mines, together with an abundance of capital and highly skilled labor,

have made Belgium a great manufacturing country, the manufactured product per capita being larger in Belgium than in any other nation of Europe except Great Britain and perhaps Germany.

The metal and glass industries are centered in the mining districts, near Liege and Charleroi, but metal working tools, spinning and weaving machinery, railroad materials, and hardware are manufactured at Ghent, Brussels, Liege, and other cities.

Woolen, cotton, and linen goods are produced in great quantities. The great linen factories of the country are situated in the flax-growing region, a little to the west of Brussels. The manufacture of fine cotton goods is carried on in Ghent, Tournai, Courtrai and the neighborhood, the cotton being carried up the Scheldt, or more directly by ship canals from Ostend on the North Sea, or from Terneuzen in Holland, on the lower Scheldt. Large quantities of inferior cotton goods for export to Africa are also produced. The famous Mechlin lace is manufactured in the city of the same name, and gives employment to many of the inhabitants.

The silk industries are carried on mainly at Verviers and Limburg. Some wool is grown in the same region.

Brewing and distilling are extensively carried on, the national beverage being beer. The distilleries use great quantities of beets, potatoes, and cereals. Antwerp is the center of these industries as well as of sugar refining.

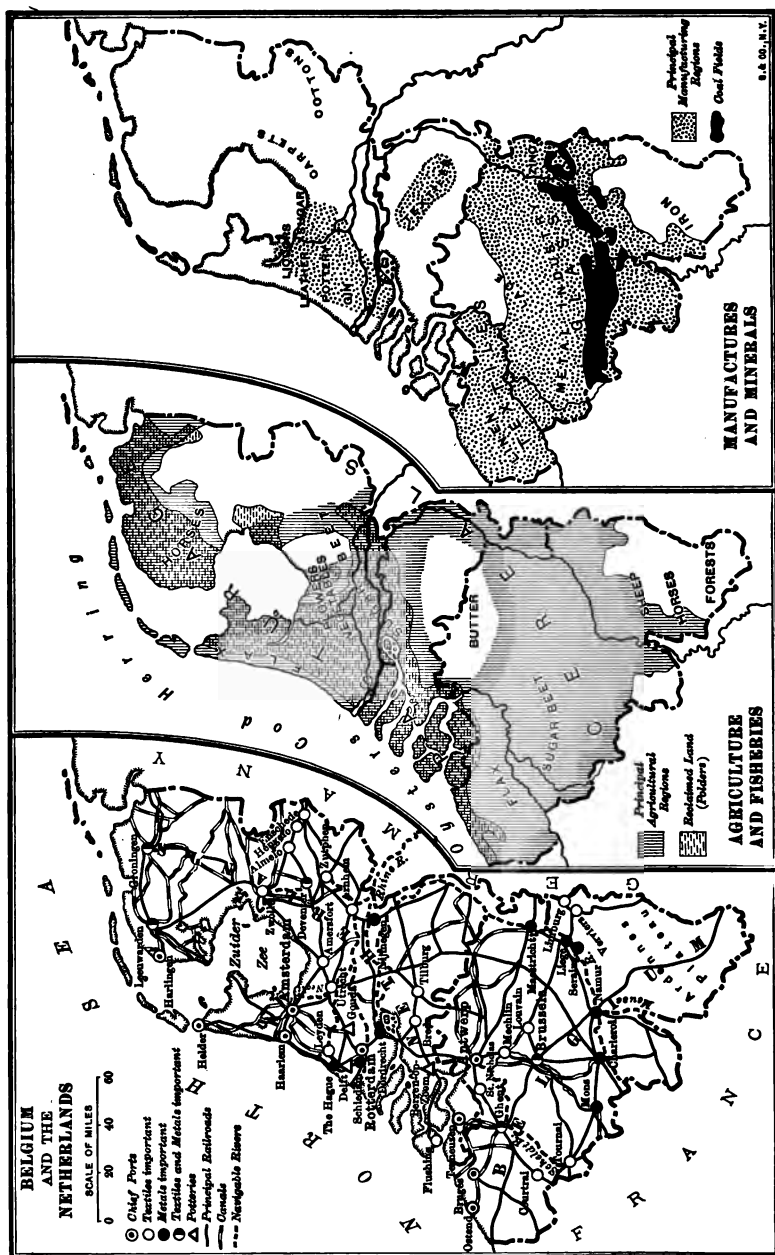
Transportation Facilities and Commerce.—The Meuse and Scheldt are connected with each other and with a number of smaller rivers by numerous canals, which, in connection with a very complete system of railroads (25 miles per 100 square miles), afford excellent means of communication between different parts of the country, and compensate for the limited coast and the few harbors.

The foreign commerce of Belgium, of which about 55 per cent consists of imports, is exceeded by that of only five countries in the world. The details of this trade are given in the table.

IMPORTS		EXPORTS	
Wheat and Other Grain . . .	15%	Flax and Linen Goods . . .	9%
Fibers (chiefly wool) . . .	12	Iron and Steel	7
Non-metallic Minerals . . .	6	Coal	7
Timber	5	Wool and Woolen Yarn . . .	6
Chemicals and Drugs . . .	4	Glass	5
Crude Metals and Ore . . .	4	Zinc, Lead, and Copper . . .	4
Oil Seeds	3	Chemicals and Dyes	3
Raw Hides	3	Machinery	3
Diamonds (rough)	2	Wheat	3
Rubber	2	Raw Hides	3
Machinery }	4	Fertilizers (mfd.)	2
Petroleum }		Diamonds (cut)	2
Coffee		Rubber	2
	60%		56%
FROM		To	
France	16%	Germany	22%
Germany	14	Great Britain	19
Great Britain	12	France	19
United States	12	Netherlands	11
Netherlands	9	United States	5
Russia	6	Norway and Sweden	3
	69%		79%

The chief imports into Belgium from the United States are wheat, provisions, raw cotton, oil cake, and petroleum. The exports to the United States are much less in value and are chiefly rubber goods and glass. Most of the commerce of Belgium is carried on by British, German, and Dutch ships. The people living in the southern part of the country speak the French language, while the Flemish, not unlike the Dutch, is spoken in the north.

Chief Ports. — *Antwerp*, on the Scheldt, is the chief commercial city of Belgium, and through this port more than three fourths of the sea trade passes. At high tide the largest vessels can ascend the river to its docks. The city is well situated for communication with the interior, and, being a convenient port for Germany, serves as a point of distribution for the iron and steel products of that country.



Brussels, Ghent, and Bruges, though far inland, have, by means of ship canals, been made seaports of some importance. *Ostend*, located on a good harbor, is also a seaport of value.

THE NETHERLANDS

Area, 12,500 square miles. Population, 5,100,000. Density, 407

Location and Surface. — The Netherlands, or Holland, lies north of Belgium, between Germany on the east and the North Sea on the west and north. The surface is exceedingly low and flat. In some places it lies below the level of the sea. Sand bars, formed by the action of the waves, have separated shallow bays from the sea, and these have been gradually filled in by deposits from the rivers, thus forming low, flat lands. Much of this land, by diking and pumping out the water, has been reclaimed, forming "polders."

Industries. — The soil of the polders is moist and rich, and excellently suited for pasturage. Consequently, dairying and the raising of live stock are important industries. In the interior the soil is not so well adapted to agriculture, but in parts of the country, especially on the river clays, rye, oats, potatoes, and sugar beets are raised. All together about one third of the surface is cultivated, and one third is devoted to pasturage, while perhaps a third of the people are devoted to agricultural pursuits; but grain must be imported to meet the needs of the dense population. About 35 per cent of the population is engaged in manufacturing, and the remainder chiefly in commercial and professional pursuits and in the valuable North Sea fisheries. The raising of flowers and vegetables is also an important industry.

The chief manufactures are textiles (cotton, linen, and woollens), bricks, tiles, earthenware and glassware, liquors, sugar, and leather goods. The level surface of the country permits wind power to be used for manufacturing purposes as well as for pumping water. There are large manufactories of earthenware at Delft, and famous gin distilleries at Schiedam.

Chief Ports.—The chief ports are *Rotterdam*, *Amsterdam*, and *Flushing*. Rotterdam has about half the tonnage of the foreign trade of London, and is one of the important seaports of the world. It handles about 58 per cent of the tonnage of the sea-borne foreign trade of the Netherlands, and more than twice as much as Amsterdam and Flushing combined. It is connected directly with the sea by means of a ship canal. *Harlingen*, on the *Zuider Zee*, and *Flushing*, on the North Sea, have considerable commerce with England.

Groningen and *Leeuwarden*, in the north, are important shipping centers for dairy products and in the cattle trade with the United States. *Utrecht* is the chief railway center of the Netherlands. The *Hague* is famous for its artistic industries. *Almelo* and *Hengelo* manufacture linen.

Commerce.—Transportation facilities are excellent. Numerous rivers, canals, and railroads cross the country in all directions. There are, moreover, many smooth, brick wagon roads. Commerce is of far greater importance than manufactures. The colonies of the Netherlands, chiefly in the East and West Indies, have an area sixty times as great as that of the mother country. These colonies trade chiefly with the Netherlands, whence their products are distributed and their supplies collected from other countries. Hence iron and steel goods, cereals and flour, textiles and fibers, indigo, coffee, rice, tin, and petroleum figure largely as both exports and imports of the Netherlands. The imports of all these generally exceed the exports, a portion being retained for home consumption. The exports of dairy products, flax, and beet sugar, however, generally exceed the imports.

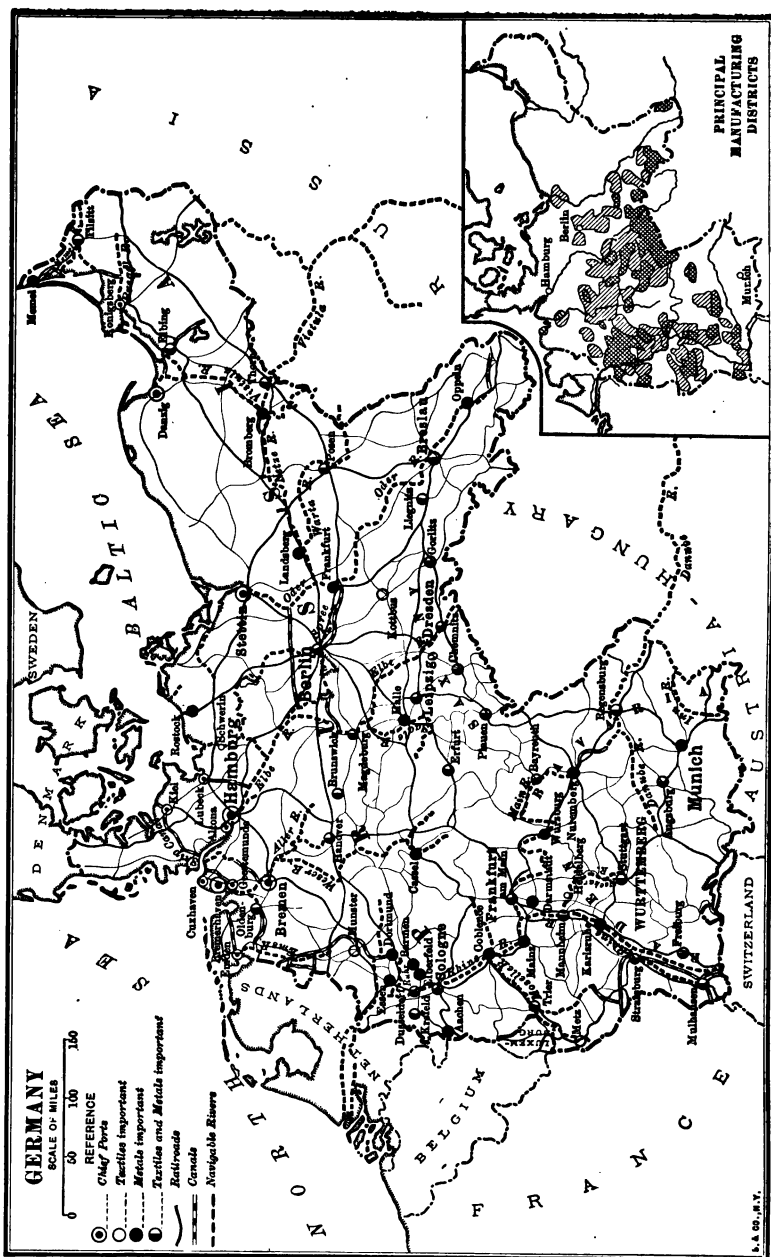
The kingdom of the Netherlands is a free trade country. For many centuries, until the Napoleonic wars of the eighteenth century almost totally destroyed her commerce, this country, like England, had a large part of the carrying trade of the civilized world. Later, commerce revived, so that to-day the Netherlands nearly equals France in value of foreign trade, and ranks as the fifth country in the world in that respect.

Of the total foreign commerce of the Netherlands in domestic exports and imports for home consumption, about 55 per cent consists of imports. The trade with the United States (chiefly import) consists in the exchange of East Indian coffee, drugs, and spices, for corn, wheat, tobacco, pork, and petroleum.

IMPORTS		EXPORTS	
Cereals (chiefly wheat)	17%	Peruvian Bark	14%
Peruvian Bark	12	Grain and Flour	10
Iron, Steel, Machinery	9	Iron, Steel, and Machinery	7
Copper, Tin, Zinc	6	Butter, Oleomarg., and Cheese	6
Fibers and Textiles	5	Textiles and Fibers	6
Timber and Stone	5	Copper and Tin	6
Rice and Sugar (raw)	4	Refined Sugar and Rice Flour	5
Coal and Petroleum	3	Chemicals and Dyes	3
Coffee and Tea	3	Vegetables	3
Chemicals and Dyes	3	Coffee	2
Tallow, Lard, Margarine	2	Paper	2
Oil Seeds and Palm Oil	2	Fish and Food Animals	1
	<u>71%</u>		<u>65%</u>
FROM		To	
Germany	26%	Germany	49%
Dutch East India	16	Great Britain	25
Great Britain	11	Belgium	11
Belgium	11	United States	6
United States	11	Dutch East India	3
Russia	10	France	1
	<u>85%</u>		<u>95%</u>

The language of the Netherlands is Dutch, which is quite distinct from the language of Germany.

Colonial Possessions of the Netherlands. — These include the Dutch East Indies, — Java, most of Sumatra, Celebes, Banca, Billiton. Molucca Archipelago, and parts of Borneo and New Guinea in Asia, and Dutch Guiana and the Curaçao Islands in America.



CHAPTER XXIII

GERMANY

Area, 210,000 square miles. Population, 56,400,000. Density, 269

Location and Surface. — The German Empire extends from the North Sea and the Baltic south to the Alps, and from France and Belgium on the west to Russia on the east. It is one of the great powers of Europe, not alone in its military strength, but also because of its industrial and commercial activity. It is composed of twenty-three states and three free towns. The principal states are Prussia, Bavaria, Wurttemberg, Baden, Saxony, and Mecklenburg-Schwerin. Of these Prussia is by far the largest, its area and population being more than one half that of the entire empire.

The Hanseatic League. — Toward the middle of the thirteenth century an organization, called the Hanseatic League, was formed between the German cities of Hamburg and Lubeck for mutual protection against pirates and robbers by sea and land. Shortly after its organization Bremen joined the league, and afterwards other cities and towns, until eighty-five were in the organization, which extended from western Russia to London.

The existence of this league had a great effect on the civilization of northern Europe. It checked piracy and robbery, developed industries of all kinds, created a legitimate trade with the eastern and southern countries, and, by reason of the prosperity of its own towns, encouraged European countries outside the league to form trade relations with distant lands.

After the dissolution of the league in 1630, Lubeck, Hamburg, and Bremen remained Free Hanse towns for centuries, making their own customs regulations ; but in 1891 these were formally incorporated with Germany, although each of these cities still sends its special representative to the Imperial Reichstag, as if it were a state instead of a city.

The northern and eastern parts of the empire form a part of the great plain of northern Europe, which here consists, in the

extreme north, of a sandy coast plain, which is not very fertile. Notwithstanding this fact, it has, by scientific farming, been made to yield large crops. Large and navigable rivers traverse the plain, and afford excellent means of communication between different parts of the country. In the south the surface is a plateau, bearing mountain ranges.

Climate. — In the western part of the country the winters are mild, grapes being grown in abundance in the valley of the Rhine. In the east the winters are longer and colder.

Natural Resources. — Extensive deposits of coal, iron, copper, zinc, lead, silver, and salt occur. The coal and iron give rise to great industrial establishments. Most of the coal comes

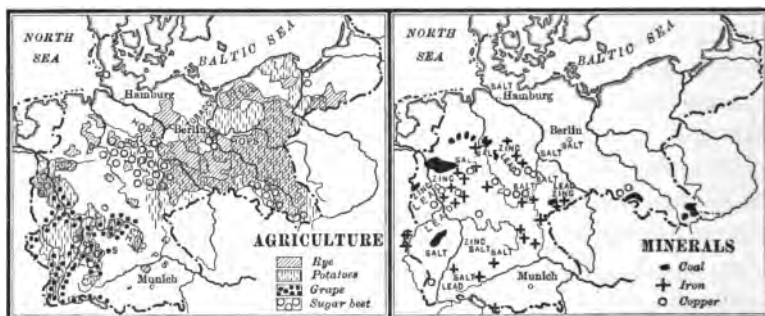


FIG. 145. — Germany — Agriculture and Mining.

from the lower Rhine valley in the west and the upper Oder valley in the southeast. In the Rhine valley is also mined the greatest amount of iron. Germany ranks next after the United States and Great Britain in the production of coal and pig iron, but in the production of iron ore and steel she outranks Great Britain.

Salt occurs in great quantities in mines in Saxony. It is obtained also from salt wells in the lowlands of the north. Zinc and lead are found both in the Rhine provinces and in Silesia.

The uplands of southern Germany contain great forests of oak, beech, walnut, birch, and spruce. Forestry in the empire is under the control of the government, and, as it is conducted

on a scientific basis, forest products yield large revenues to the country. Woodcutters are compelled by law to plant a tree for every one they destroy.

Great numbers of cattle are raised throughout the country, and dairy products are consequently important. The raising of horses is an important industry on the grassy plains in the northwest. This industry is encouraged by the government, in order to obtain good saddle horses for the cavalry. Sheep, for wool, are raised in great numbers, but during late years this industry has decreased.

Agriculture. — About one half of the entire area of the German empire is under cultivation, a proportion slightly less than that in France, and nearly two and a half times as great as that in the United States.

The chief grain crops are rye, oats, wheat, and barley. Wheat is grown mainly in the south and west. The other grains are grown principally in the north and east. The grain employed for breadmaking by the peasantry is chiefly rye. The cultivation of the grape is carried on in many parts of the middle Rhine, this district being the most northern region in the world in which this industry is successful.

One of the principal agricultural crops is potatoes, of which Germany raises more than any other country of the world.

The cultivation of the sugar beet extends over all parts of the plains of Germany, being fostered by the government by the payment of large bounties. As a result Germany produces a greater amount of beet sugar than any other country in the world, raising more than one third of the world's product. From one half to two thirds of the crop is exported. A part of this is refined in the United States. The sugar beet and the potato are employed in large quantities by the distillers in the northern part of the empire for the manufacture of spirits. Hops are cultivated, and vast quantities of beer are brewed, much of which is consumed at home.

Tobacco is grown in the southern and western parts of the country.

Manufactures. — Germany holds third rank among the manufacturing nations of the world. The manufacture of iron and steel and of articles made from them are of the first importance and give employment to a greater number of people than any other branch. The Krupp iron and steel plant at Essen is one of the largest in the world. In shipbuilding Germany ranks next to England. The textile manufactures of Germany — woolens, silks, cottons, and linens—give employment to almost as many people as those of metal. The raw materials required for these are imported as follows: wool from Australia and Argentina; silk from China and Italy; cotton from the United States; and flax from Russia.

Many manufacturing cities and towns are situated in the Rhine provinces, among which Barmen and Krefeld manufacture silk, woolen, and cotton goods. Cotton goods are also manufactured in Alsace and Lorraine. Saxony has valuable coal fields and is also famous for its sheep, the wool from which supplies important woolen mills, chiefly located at Chemnitz. Breslau also has large woolen mills. Nuremberg in Bavaria is famous for its manufacture of toys.

Since its establishment in 1871, the German empire has made rapid strides in its commercial and industrial development, and is now excelled in these respects only by the United States and Great Britain. Although this change has been due in no small degree to the development of the coal and iron mines, and the growth of industries associated with this development, yet the great increase in the railroad system, and, even more important, the attention that is paid to the education of the masses, have been perhaps the most efficient factors in the development.

Transportation Facilities. — Germany has a magnificent system of internal waterways. The Rhine, Elbe, Oder, and Vistula are navigable across the entire empire, and are connected with one another by canals, and the Danube, a great river of southern Europe, which has its head in southern Germany, has been connected with the Rhine by a canal. In addition to these, a ship canal extends from the mouth of the Elbe to the Baltic Sea.

An excellent system of railroads, some 35,000 miles in extent, crosses the empire in various directions. These, together with the rivers and canals, give the empire great facilities for internal commerce. The majority of the railroads are owned by the government.

Commerce. — The foreign trade of Germany is about equal to that of the United States, but unlike that of the United States the imports are slightly greater than the exports. The table shows the details of the foreign trade.

IMPORTS		EXPORTS	
Fibers	17%	Textiles and Clothing	16%
Cereals	9	Metal Wares	9
Animals and Eggs	6	Coal	5
Fats and Oils	5	Machinery and Instruments	5
Raw and mfd. Metals and Ores	4	Books, Maps, etc.	4
Wood and Manufactures	3	Leather and Leather Ware	4
Hides and Skins	3	Fibers	4
Coffee and Cocoa	3	Beet Sugar	3
Coal and Petroleum	3	Grain, Flour, and Meal	2
Raw Nitrates, Rubber, and Dyes	3	Dyes	2
Tobacco	2	Paper	1
Textiles	1	Hops and Beer	1
	59%		56%
FROM		To	
North and Central America	16%	Great Britain and Ireland	20%
Russia	14	Austria-Hungary	10
Austria-Hungary	12	North and Central America	10
Great Britain and Ireland	10	Netherlands	8
South America and W. Indies	9	Russia	7
France	5	Switzerland	6
	66%		61%

Nearly all the North American trade is with the United States, from which Germany imports raw cotton, wheat, corn, meat, petroleum, and copper, and to which are exported raw beet sugar, and many kinds of manufactures.

The government aids and fosters the business of the empire so that, in her merchant marine, Germany ranks higher than any single nation except Great Britain and the United States.

Harbors and Ports. — A great drawback to the prosperity of the German Empire lies in the fact that she has but few good

Relative Tonnage of Chief Ports.

Hamburg	Bremen	Stettin	Danzig	Other Ports
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FIG. 146.

seaports. Her chief ports are *Hamburg*, *Bremen*, *Stettin*, and *Danzig*. *Hamburg*, situated some 60 miles up the Elbe, and *Bremen*, 50 miles up the Weser, are open all the year round.

The other ports on the Baltic are closed by ice for a longer or shorter period in winter. *Bremerhaven*, *Cuxhaven*, and *Geestemünde* are free ports. Free ports serve the same purpose in Germany as bonded warehouses do in the United States. Custom charges are levied in these ports only on such of the goods as are withdrawn for consumption in Germany. *Berlin*, the capital of the empire, and the great railroad center, has river and canal communications with the coast, and carries on an enormous trade. *Munich*, also a great railroad center, has direct communication west with the Rhine provinces, south across the Alps by the Brenner Pass, and north to Berlin.

The German language is spoken.

Colonial Possessions of Germany. — The total area of the colonial dependencies of Germany is about 1,000,000 square miles, and the total population is about 13,500,000. Germany has spheres of influence rather than colonies. These include regions on both the western coast and the eastern coast of Africa; some islands in the western Pacific; and Kiauchau, on the eastern coast of China.

CHAPTER XXIV

SWITZERLAND

Area, 16,000 square miles. Population, 3,325,000. Density, 208

Location and Surface. — The republic of Switzerland lies mainly north of Italy and south of Germany. It has Austria-Hungary on the east, and France on the west. More than half of the country is covered with high mountains. The low Jura Mountains are in the northwest, and the high Alps in the south. Between the mountains on the north and the south is a somewhat rugged plateau, where most of the people live.

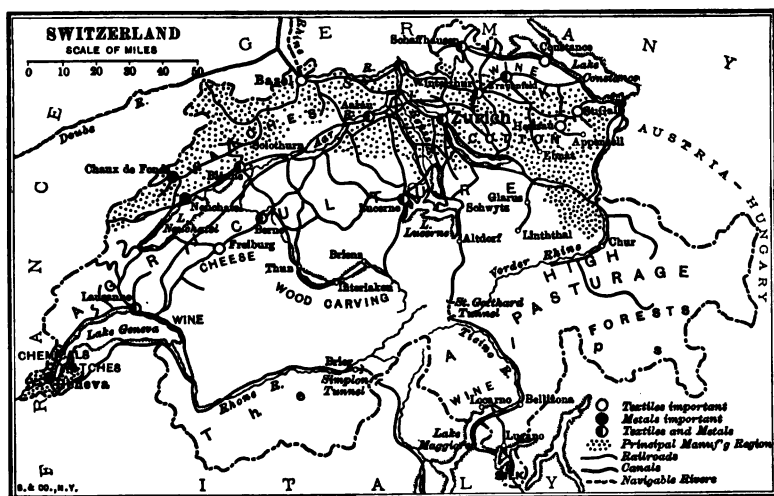


FIG. 147. — Switzerland — Chief Cities, Routes, and Products.

Industrially this small republic is peculiar and interesting. But little of the land is fit for cultivation, an amount entirely

insufficient to produce the food for the dense population. There are no valuable mines of coal and iron, and no seacoast. Moreover, there are great mountain barriers to commerce with surrounding countries; yet these obstacles have been largely overcome, and, in proportion to its population, Switzerland is one of the leading commercial countries of the world. Through the water power of many impetuous mountain streams numerous small factories have been made possible. To foster such industries the government has established fine technical schools, and the products of the factories, by reason of their high quality, find a ready market in different parts of the world.

Climate and Industries. — The climate varies chiefly with the altitude. Although agriculture is limited, the existence of fine pasturage on the mountain slopes has promoted cattle raising, and the making of cheese and the preparation of condensed milk give employment to many of the people, and add much to the exports of the country. There are some forests in the republic, which the government has taken under its control, and it has replanted many areas which had been stripped of their forest cover.

Manufactures. — Among the manufactures the textile and the metal industries are the most important. The products manifest the skill and taste of the people. Zurich is the great center for manufacturing. Here are the large silk and cotton mills that produce among other goods machine embroideries, known by the trade name of Swiss edgings. These are in great demand over a large part of Europe, and even find a market in the United States, as do also fancy silk ribbons made in the same place.

Berne and St. Gall are also famous for their machine embroideries. Basel, Zurich, and Lucerne manufacture silk goods. Wood carving is an important industry in the neighborhood of Interlaken. Electric machinery of a high grade is manufactured in Switzerland, and many of the smaller water powers have been employed in the manufacture of electro-chemical products.

Geneva is an important city by reason of its situation in an

opening between the Alps and the Jura Mountains. It excels in the manufacture of watches, clocks, music boxes, scientific instruments, and chemicals.

Commerce. — The development of silk manufacture in Switzerland, the raw material for which is obtained in Italy, is a matter of recent history. Until the completion of the $9\frac{1}{2}$ -mile railway tunnel in St. Gotthard Pass, commerce with the people



FIG. 148. — Entrance to St. Gotthard Tunnel.

south of the Alps was too difficult, dangerous, and expensive to be general. Since the opening of this tunnel, however, local commerce and through traffic have increased so much that another and greater tunnel has been pierced through the Alps. This, the Simplon Tunnel, is $12\frac{1}{2}$ miles long and opens a direct route from Milan to Paris that will greatly benefit Switzerland. A third tunnel, the Arlberg, $6\frac{1}{2}$ miles long in the Austrian Tyrol, connects Switzerland with Vienna.

Of the total foreign trade of Switzerland about 56 per cent is imports. The principal exports are silk goods, embroideries

and lace (32%), watches and clocks (14%), cheese and condensed milk (9%). The imports are grain from Russia, Hungary, and the United States, raw silk and cotton, sugar, iron and steel and coal. The countries with which the foreign trade is carried on are shown in the table.

IMPORTS FROM		EXPORTS TO	
Germany	29%	Germany	23%
France	19	Great Britain	21
Italy	16	America (chiefly U.S.)	16
America (chiefly U.S.)	8	France	13
Austria-Hungary	6	Italy	6
	<u>78%</u>		<u>79%</u>

The republic derives a large income from the traveling public, which brings about \$60,000,000 yearly into the country. In the northeast the people speak German, in the west French, and in the south Italian.

CHAPTER XXV

AUSTRIA-HUNGARY

Area, 261,300 square miles. Population, 47,150,000. Density, 180

Location and Surface.—The monarchy of Austria-Hungary consists of two distinct countries with separate parliaments, joined under a single emperor. It lies southeast of Germany and southwest of European Russia. It controls the greater part of the eastern coast of the Adriatic Sea.

Mountain ranges lie on or near the borders of the kingdom, and cover more than one half of its area. These mountains include the Bohmerwald and the Erzgebirge in the northwest, the Sudetes Mountains in the north, the Carpathian Mountains in the northeast, the Transylvanian Alps in the southeast, and the Dinaric Alps in the southwest. The greater part of Hungary consists of a great plain, drained by the Danube River. Tributaries of this river rise in the mountain districts near the boundaries.

Climate.—The summers are somewhat warmer and the winters colder than in the countries of western Europe, and there is less rainfall, especially in the interior plain, where in some years it amounts to but 20 inches, but since much of this falls during the spring and summer the climate is well adapted to agriculture.

Agriculture.—Up to 1849 the peasants of Austria were serfs, who paid for the land that they were allowed to cultivate by working two days of each week for their masters and giving them besides a part of their products. This kept them in a

state of abject poverty. Since their emancipation in 1849 agriculture has steadily improved.



FIG. 149. — Austria-Hungary — Chief Cities, Routes, etc.

The country is in many respects eminently fitted for agriculture, but the methods employed in farming are primitive. Notwithstanding this, sufficient grain is produced for home consumption and a little for export. Wheat and Indian corn are especially abundant in Hungary. The wines of Hungary, especially Tokay, are of the finest quality. Austria produces chiefly rye and oats. Grapes, potatoes, beets, and hemp are also produced in Austria-Hungary. Forests of pine, beech, and oak are cultivated under control of government on the mountains, especially on the Carpathian Mountains and in those of northwestern Austria.

About one fourth of the total area of the country is in pasture lands, and many horses and mules are raised on the plains.

Poultry is raised in immense quantities, eggs forming an important article of export.

Mineral Products.—The kingdom of Austria is especially rich in minerals. Lead, quicksilver, coal, iron, salt, gold, and silver are the most important. Coal occurs in the north along the line of the Carpathian Mountains and the Erzgebirge.

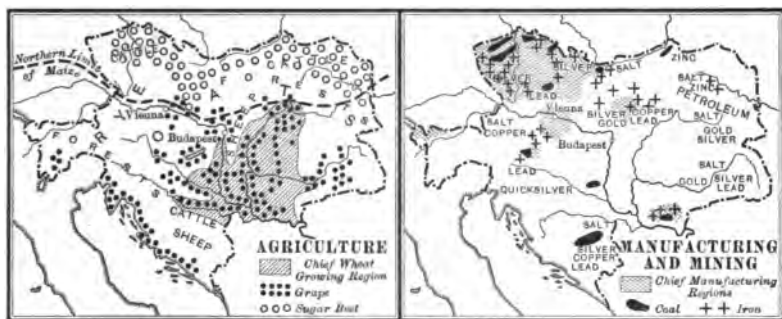


FIG. 150. — Austria-Hungary — Chief Industries.

Salt is obtained in the northwestern part of the country and also in the north, near Cracow. Here are the famous salt mines of Wieliczka, where the salt rock is 1200 feet in thickness, and extends through the country for a distance of 300 miles. Miles of galleries have been dug in the rocks, and many people live there in villages below the surface of the earth.

The lead mines of Bleiberg, on a tributary of the Drave, are the richest in Europe. Idria, in the same part of the country, has mines of quicksilver that are only excelled by those of California and Spain at Almaden. Petroleum occurs in the north-eastern part of the kingdom. There are valuable beds of coal and iron in the country, and graphite is also found.

Manufactures.—The principal manufactures are woollen and linen goods, which are woven near the coal fields, where fuel for power is accessible.

The manufacture of iron is carried on in the Alpine districts in the west. Here the iron is smelted by charcoal obtained from the forests on the mountain sides.

Vienna, the largest and most important city of the kingdom, lies in the region of densest population. It is the center of the Danube trade and of many manufacturing industries. *Budapest*, lower down the Danube, is the center for the grain trade of the plains.

There is a dense population also in Bohemia and Moravia in the northwest. At Pilsen and Eger, in Bohemia, where the necessary raw materials can be obtained, the celebrated Bohemian glass is made. Around Vienna and Prague are located the leather industries, where gloves and other articles are made from sheep, lamb, and goat skins. These form important exports of the country.

The exports of Austria-Hungary slightly exceed the imports in value.

The details of the foreign trade are given in the table.

IMPORTS		EXPORTS	
Fibers and Textiles (wool and cotton)	26%	Stoves, Wood, and Wares	15%
Machinery and Metals	7	Sugar	9
Coal and Petroleum	6	Textiles and Fiber (wool)	8
Hides and Leather	5	Eggs and Feathers	6
Tobacco	3	Cattle and Horses	6
Coffee	3	Glassware and Jewelry	5
Corn and Rice	2	Leather and Hides	5
Books, etc.	2	Barley and Beans	5
Cattle and Horses	2	Malt, Hops, and Beer	5
Dyes and Chemicals	2	Lignite and Coal	4
	58%		68%
FROM		TO	
Germany	38%	Germany	52%
Balkan States	9	Great Britain	9
Great Britain	8	Balkan States	9
United States	8	Italy	8
Italy	7	Russia	4
Russia	5	Switzerland	3
British India	5	France	3
	80%		88%

Commerce.— The merchant marine of Austria-Hungary is not large, but it carries a large sea-borne commerce from the ports of *Trieste* and *Fiume* on the Adriatic. Trieste is the port where the Austrian Lloyd steamers connect with various countries on the Mediterranean, the far East, and the United States. Fiume is the port from which most of the wheat of Hungary is exported. The railway system is not so well developed as in most other European countries, there being only about 24,000 miles of railroads in the kingdom, but an immense traffic is carried on the Danube and Elbe rivers.

Many different races comprise the population of the kingdom, and many different languages are spoken. About one fourth of the population speak German. The Germans live mainly in Austria, the Magyars in Hungary, the Czechs in Bohemia, the Poles in Silesia, and the Italians and other races in different parts of the country.

Austria-Hungary has no colonies or dependencies. Bosnia and Herzegovina have been placed under her charge for administration and military occupation by the united powers.

CHAPTER XXVI

SPAIN AND PORTUGAL

The independent kingdoms of Spain and Portugal occupy the Iberian Peninsula, at the southwestern extremity of Europe, between the Mediterranean and the Atlantic Ocean. The Balearic Islands and the Canary Islands are usually considered part of Spain, and the Azores and the Madeira Islands, part of Portugal.

SPAIN

Area, 195,000 square miles. Population, 18,500,000. Density, 95

Surface and Climate. — The greater part of Spain is a plateau, whose surface is about half a mile above the level of the sea. The plateau is crossed by several mountain chains. There are some lowlands in the valleys of the principal rivers.

The coast lands are generally warm, but the plateau has cold winters. The rainfall in the western part of Spain and nearly all of Portugal is sufficient for agriculture, but in the central and eastern part of the plateau irrigation is practiced. The densest population is near the coast.

Agriculture. — Although the valleys are fertile, they are separated by high mountain ranges, which prevent ready communication between the different parts of the country. The rivers are, in most cases, navigable only for very short distances, and are used mainly for irrigation. Agriculture is carried on, wherever water can be obtained in sufficient quantities, but is in a much less advanced condition in the Iberian Peninsula than in France because until recently a large proportion of the land

was held in large estates, taxes are high, and the farming is done in a primitive way with antiquated implements.



FIG. 151. — Spain and Portugal — Chief Cities, Routes, and Products.

Grapes, olives, almonds, chestnuts, and some varieties of wheat, that do not need much water, are grown in abundance. Wheat

and grapes are raised through the central parts of the country and olives in the warmer parts in the south. Rye, oats, and barley are grown on some parts of the table-land, and the mulberry tree is cultivated on the eastern coasts. Large quantities of corn are grown on the western coastal plain, where there is a warmer climate and greater rainfall. The cork oak is grown in different parts of both Spain and Portugal.

The dry area of the table-land makes it peculiarly adapted to the raising of sheep. For several centuries Spain led the world both in the quantity and quality of the wool it produced; but, like other industries of the country, sheep raising has declined, so that to-day the country produces only a small amount of wool and that of inferior quality.

Mineral Products.—Spain has long been famous for its mineral wealth. Mining is now, however, in a backward state.

Excellent iron ores are mined in the northern part of Spain, near Bilbao, and considerable quantities are sent to Great Britain and France for smelting. Lead and copper are mined in the south, and quicksilver in the central part. Spain leads the world in the production of this metal. The mines are situated at Almaden, near the central part of the peninsula.

Manufactures and Commerce.—Neither Spain nor Portugal possesses manufactures of any great importance, except the making of wine and the curing of raisins. The Spanish people themselves never developed the industrial arts, and when, in the sixteenth century, they drove the Moors from their country, they lost what chance they had of acquiring these arts.

Barcelona is the center of the little manufactures and commerce the country possesses. Cotton and wool are the chief textiles manufactured. *Bilbao* is the center of the trade in the north; it has limited smelting works and manufactories of iron. The extreme eastern coast is the greatest silk-producing part of the country, the principal manufactories being situated at *Valencia* and *Murcia*.

The chief seaports are *Barcelona*, *Bilbao*, *Cartagena*, *Cadix*, and *Malaga*.

The imports of Spain have a slightly greater value than the exports. The details of the foreign trade are given in the following table :

IMPORTS		EXPORTS	
Fibers (cotton) and Textiles	17%	Ores (iron)	19%
Machinery, Iron, and Steel	15	Fruits, Olive Oil, Nuts	12
Grain (wheat)	8	Wine	12
Coal	6	Lead, Copper, Mercury, Iron, Steel	12
Timber	5	Cotton (mfd.)	5
Animals and Hides	5	Hides and Animals	4
Chemicals	4	Cork	4
Coffee and Cocoa	3	Boots and Shoes	2
Tobacco	3	Paper and Esparto Grass	2
Fish	2		
	68%		72%
FROM		TO	
Great Britain	23%	Great Britain	41%
France	17	France	20
United States	14	Cuba	7
Germany	11	Germany	6
Portugal	4	Portugal	5
Belgium	4	Italy	5
	73%		84%

Colonies and Dependencies of Spain.—The total area of the colonies and dependencies of Spain, exclusive of the Canary Islands, is about 253,500 square miles, and the total population is about 273,700. These dependencies occupy a part of the western coasts of Africa south of Morocco, a small territory south of Kamerun on the Gulf of Guinea, and some small islands in that gulf of which Fernando Po is the largest.

PORTUGAL

Area, 35,700 square miles. Population, 5,400,000. Density, 151

Portugal occupies the greater part of the fertile western coast, and having a comparatively small amount of table-lands, is more densely populated than Spain. The industries of Portugal, however, are in the same backward condition as those of Spain. The imports are twice as great as the exports. The

principal export is port wine manufactured at *Oporto*, the chief seaport. The commerce with the United States consists in an exchange of raisins, nuts, wines, and fruit, for wheat, petroleum, and tobacco. The details of the foreign trade are given in the table.

IMPORTS		EXPORTS	
Fibers and Textiles	19%	Wine (chiefly port)	37%
Coal	9	Cork	12
Codfish	6	Fish	7
Sugar, Coffee, and Tobacco . . .	6	Animals	7
Machinery, Iron, and Steel . . .	5	Olive Oil	2
Rice and Wheat	3	Eggs	1
Hides and Skins	3	Figs	1
	51%		67%
FROM		To	
Great Britain	31%	Great Britain	29%
Germany	17	Brazil	19
Spain	11	Spain	16
France	10	Portuguese Colonies	12
United States	7	Germany	6
	76%		82%

The Colonies and Dependencies of Portugal. — The total area of the colonies, etc., of Portugal, exclusive of Madeira and the Azores, is 803,000 square miles, and the total population 9,160,000. These colonies embrace: Portuguese Guinea, Cape Verde Islands, the Principe and St. Thomas islands, Angola in southwest Africa, and Portuguese East Africa, some small territories in India (Goa, Damão, Diu), part of the island of Timor in the East Indies, and Macao on the coast of China.

CHAPTER XXVII

ITALY

Area, 110,700 square miles. Population, 32,500,000. Density, 294

Location and Surface. — The kingdom of Italy borders France, Switzerland, and Austria-Hungary, and occupies the peninsula between the Adriatic and Mediterranean seas. It also includes the islands of Sicily and Sardinia. It is a little larger than the state of Colorado.

The high mountain ranges of the Alps lie in the north, and the Apennines extend through the middle of the whole peninsula. Both of these ranges of mountains have many passes through them, and railroads have been constructed, so that the eastern and western sides of the peninsula are connected with the surrounding countries. For example, Italy is connected through the Alps with France by the Mt. Cenis Tunnel, and with Switzerland by the St. Gotthard and Simplon tunnels.

The Po is the longest river in Italy. Much of its broad alluvial plain is lower than ordinary high-water level of the river, and is protected from overflow by dikes or levees. The Adige is navigable beyond the Italian border. The Arno and the Tiber are the largest rivers in the western part of the peninsula, and are navigable by small boats for short distances. The remaining rivers of the peninsula are short, swift streams, unfit for navigation, so that the internal communication of the country is carried on mainly by the railroads.

Climate and Agriculture. — Though surrounded by the sea, the climate is hot and rather dry. In the central and southern parts nearly two thirds of the rainfall occurs during autumn and winter, and irrigation is necessary. In northern Italy there is

oranges, and lemons thrive in the extreme south. The last two articles are exported to northern Europe. Considerable attention is given to stock raising (cattle, sheep, and hogs), and meat and eggs form articles of export.

Agriculture is the most important industry and silk the principal product. More than one third of the total value of the exports consists of silk. Italy holds third rank as a silk-producing country, being exceeded in this respect only by China and Japan.

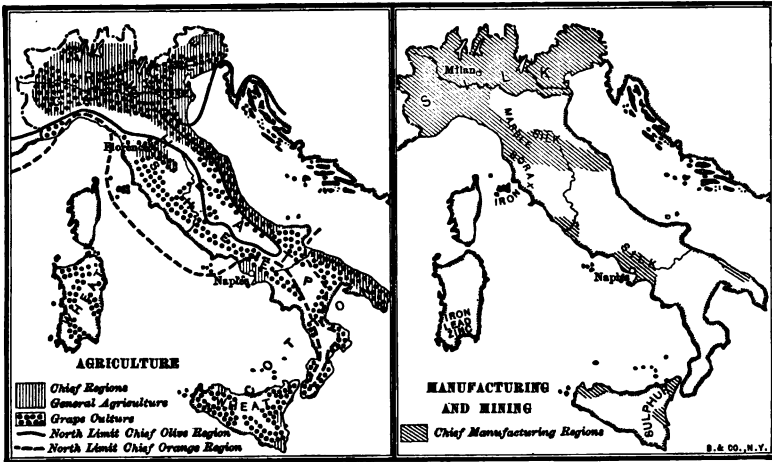


FIG. 153. — Italy — Chief Industries.

It ranks next to France as a wine-producing country, the Chianti wines produced near Florence and the Marsala wines of Sicily being among the best known. Olives and olive oil are also valuable products.

Mineral Products. — The sulphur mines of Sicily are among the greatest producers in the world. Zinc and lead ores are obtained from Sardinia, and iron ores from Elba and Sardinia. Sulphur, zinc, and lead ores are exported. The United States takes one third of the output of sulphur. Carrara marble, highly esteemed for sculpture, forms an important article of export. Boracic acid, from which borax is made, comes from hot springs in Tuscany.

Manufacturing industries are growing, yet the country does not at present rank very high in this respect. They are most developed in the north, near the principal markets. Milan, in Lombardy, is the center of the silk industry. Como, Turin, Florence, and Naples are also engaged in this branch of manufacture.

Commerce. — Of the foreign commerce of Italy, about 55 per cent are imports. The details of the foreign trade are given in the table.

IMPORTS		EXPORTS	
Fiber (cotton and silk) . . .	20%	Fiber (silk)	36%
Grain (wheat)	12	Wine and Olive Oil	8
Coal and Petroleum	9	Textiles (silk and cotton) . .	7
Machinery, Iron, and Steel . .	5	Sulphur, Ores, and Marble . .	5
Hides and Horses	4	Eggs and Meat	4
Timber	3	Oranges, Lemons, and Nuts . .	3
Textiles (wool and silk) . . .	3	Cattle, Hogs, and Hides . . .	3
Tobacco, Coffee, and Sugar . .	3	Coral (mfd.)	2
Fish	2	Rice and Grain	2
	61%		70%
FROM		To	
Great Britain	16%	Switzerland	18%
Germany	13	Germany	17
United States	12	United States	12
France	11	France	11
Russia	10	Great Britain	10
Austria-Hungary	10	Austria-Hungary	9
Balkan States	6	Argentina	4
	78%		81%

Italy sends to the United States silk, sulphur, marble, olive oil, and wine, and receives in return grain, cotton, machinery, and tobacco. About 62 per cent of the imports and 45 per cent of the exports are sea-borne.

Chief Ports. — The chief seaports are *Genoa* in the north and *Naples* in the south. Genoa, since the opening of the St. Gotthard Tunnel, competes with Marseilles for the trade of Switzerland and southeast Germany. *Leghorn*, on the western coast, and *Venice*, on the Adriatic side of the fertile northern

plains, are also important ports. *Brindisi* is the port of the great Peninsular and Oriental Steamship Company, and has railway communications through central Italy with northern Europe. *Palermo*, *Messina*, and *Catania* are important ports in Sicily.

Colonies and Dependencies of Italy. — The total area of the colonies and dependencies, etc., of Italy is about 188,500 square miles, and the total population about 800,000. The dependencies include the colony of Eritria on the western coast of the Red Sea, and the east African territory called Italian Somaliland.



CHAPTER XXVIII

THE BALKAN STATES

The Balkan States, lying between the Adriatic and the Black seas, include Roumania, Bulgaria, Servia, Montenegro, European Turkey, and Greece. Roumania, Bulgaria, and Turkey border on the Black Sea; the other states, including Turkey, border on the Mediterranean. Servia alone has no seacoast.

The Balkan peninsula is generally mountainous, being traversed by the Transylvanian Alps, the Balkans, and the Pindus Mountains. Nearly all the peninsula slopes toward the east. The climate in the northern part is of the continental type, with hot summers and rather cold winters. In the south, however, the climate is of the subtropical type.

The peninsula is important in a commercial sense principally from the fact that a number of important trade routes between the west and the east pass through it.

The principal waterway, the Danube, when taken in connection with the Rhine and the canals connected therewith, affords water communication between the Black and the North seas. The neutrality of this river is insured by a combination of the great powers of Europe, who have absolute control over the lower parts of the Danube.

GREECE

Area, 25,000 square miles. Population, 2,435,000. Density, 97

The kingdom of Greece occupies the mountainous southern part of the peninsula between the Ægean Sea and the Mediterranean, and includes the islands of the adjacent archipelago.

The climate greatly resembles that of southern Italy and Spain. Most of the rainfall occurs in winter and prevents extended agriculture without irrigation. Where irrigation is possible, however, wheat, barley, Indian corn, grapes, currants, olives, tobacco, and cotton are raised. Some silk is also produced in southern Greece.

Manufactures, except in home industries, have never been developed. There is no coal, and the mines of lead and iron are not extensively worked.

Commerce. — The imports form about 63 per cent of the foreign trade, and consist chiefly of cereals (27%), textiles (14%), timber (10%), and coal and iron (10%). The chief exports are currants (29%), ores (24%), olive oil and figs (12%), and wine (6%). Two thirds of the imports are from Russia, Great Britain, Austria-Hungary, and France; while about the same proportion of the exports go to Great Britain, the Netherlands, France, and Turkey.

A ship canal has been constructed across the isthmus of Corinth, which has greatly shortened the sea voyage between the eastern and western coasts of the country.

There are many excellent harbors, and Greek sailors do much of the carrying trade of the Mediterranean countries. The chief ports are *Piræus*, near *Athens*, and *Patras*, on the western coast. Modern Greek is the language of the country.

TURKEY OR THE OTTOMAN EMPIRE

Area, 1,154,000 square miles. Population, 24,000,000. Density, 21

The Turkish or the Ottoman Empire includes, besides Turkey in Europe, the western part of Asia, between the Black and the Mediterranean seas, together with strips of land along the Red Sea and the Persian Gulf, on the western and eastern coasts of Arabia, and Tripoli in Africa.

Turkey in Europe has an area of but 64,600 square miles and a population of 5,900,000, about 91 to the square mile. The

surface is undulating, with hills of moderate elevation, rising to mountains in the western part. The greater part of the land is of moderate elevation. The soil is excellent, and, with proper cultivation, would raise enormous crops.

On the whole the country is well fitted for agriculture, but, since the government owns most of the land and the tenants are obliged to give an uncertain part of the crops to the officers, very little progress has been made. However, crops of corn, tobacco, cotton, fruits, including grapes, coffee, and opium are raised.

Commerce, etc.—The chief seaport of European Turkey is *Constantinople*, which has a magnificent harbor, and is connected with the west by means of a railroad, one of the few in the country. *Saloniki*, a seaport on the *Ægean* with railroad connections, and *Adrianople* are trade centers of lesser importance. The Turkish Empire has many miles of seacoast, and a great number of excellent harbors; but the low state of civilization of the people, together with the backward condition of agriculture and the wretched despotic government, have greatly retarded the country's commercial development.

The foreign trade of the whole empire equals approximately that of Mexico, and two thirds of it consists of imports. The details of the foreign commerce of European and Asiatic Turkey are included in the table.

IMPORTS		EXPORTS	
Textiles (chiefly cotton) . . .	30%	Silk, Wool, and Hair	23%
Sugar, Coffee, Rice, and Flour .	17	Grapes, Figs, Olive Oil, and	
Ironware, Petroleum, Hides,		Nuts	20
and Coal	9	Bones and Hides	9
		Opium and Coffee	7
	56%		59%
FROM		To	
Great Britain	34%	Great Britain	35%
Austria-Hungary	19	France	31
France	12	Austria-Hungary	10
Russia	8	Italy	5
Italy	5	United States	4
	78%		85%

Tributary States of Turkey.—The tributary states of Turkey include Bulgaria, Bosnia and Herzegovina, Samos, Crete, Cyprus, and Egypt; an area of about 464,000 square miles, with an aggregate population of about 15,750,000.

BULGARIA

Area, 37,300 square miles. Population, 3,750,000. Density, 100

The principality of Bulgaria extends north from Turkey to the Danube River. The Balkan Mountains extend in a general east and west direction through the country. South of the Balkan Mountains the climate is warmer and the soil more fertile than north of the mountains. Grapes, rice, corn, cotton, tobacco, silk, and roses are grown in this part of the country. Wheat and other grains flourish and cattle are reared in the dryer and cooler northern part. Good timber is found in the mountains.

The manufactures are of but little importance. Attar of roses, obtained from rose leaves, is exported.

Commerce.—*Sofia*, the capital and chief city, is situated on the railroad from Paris to Constantinople.

The chief trading center on the Danube is *Rustchuk*, which has rail communication with *Varna*, the principal city on the Black Sea.

The principal imports are textiles (41%), machinery and metal goods (14%), and sugar, coffee, and timber (13%), chiefly from Austria-Hungary, Great Britain, Turkey, and Germany. The chief exports are wheat and corn (61%), animal food products and animals (16%), textiles and cocoons (6%). They go chiefly to Great Britain, Turkey, Belgium, and Germany.

ROUMANIA

Area, 50,700 square miles. Population, 5,900,000. Density, 116

The kingdom of Roumania lies north of Bulgaria between Austria-Hungary, Russia, and the Black Sea. The surface of the country consists mainly of a great plain, extending southeast of the Carpathian Mountains. This plain is drained by the Danube on the extreme southern border of the country.

Agriculture is the principal industry. Large crops of grain, principally Indian corn and wheat, are raised. Since corn forms the main cereal food of the inhabitants, a large part of the wheat and much corn are exported to the northern countries of Europe. Salt and petroleum are the chief minerals. Owing to the ignorance of the people, there are few manufactures. There is some weaving, but this is mainly carried on in the houses of the people, and is done by the women.

Commerce. — Of the foreign commerce considerably more than half are exports. The principal imports are textiles (48%), and metal ware (17%). The chief exports are grain (78%), wood, and animal products. About three fourths of the imports come from Germany, Austria-Hungary, and Great Britain; but more than half of the exports go to Belgium.

Bukharest is the principal trade center.

SERVIA

Area, 18,600 square miles. Population, 2,500,000. Density, 134

Servia. — The little mountainous kingdom of Servia lies south of Austria-Hungary, and west of Roumania. It is an agricultural country. Despite its mountainous surface, some 22 per cent of its area is under cultivation. The principal crops are Indian corn, wheat, and fruit in the valleys. Swine range in the oak forests and sheep and goats pasture on the hillsides.

Commerce, etc. — The kingdom has but few railroads, and its wagon roads are poor. Consequently, the commerce is limited. The imports consist chiefly of textiles and metal manufactures; the exports of animals, grain, and plums. *Belgrade*, the capital, is the chief city. On account of its situation at the junction of the Danube and the Save, it has excellent opportunities for trade. It has some manufactories of cotton, silk, and wool, but most of the weaving is done by hand in the homes of the people. The great bulk of the foreign trade is with Austria-Hungary.

CHAPTER XXIX

RUSSIA

The Russian Empire embraces about one sixth of the land area of the world, amounting, with the tributary states, to about 8,800,000 square miles. Its population is 131,000,000. The empire stretches from the Baltic, in central Europe, across Asia, to the shores of the Pacific Ocean, while it extends from lat. 40° N. to lat. 80° N., far within the limits of the Arctic Circle. The seacoasts include the Pacific on the east, the Arctic on the north, the Baltic on the west, the Black Sea and the inland Caspian Sea on the southwest. Of these the Arctic is comparatively useless, the Baltic is closed with ice for many months of the year, and the Pacific coast is, as yet, but thinly populated. The Black Sea furnishes, therefore, its most important coast.

Surface. — Most of the western and northwestern parts of the country are a great low plain. The eastern and southeastern parts are mountainous. Much of the southern border is occupied by the Caucasus and the northern mountain ranges of central Asia.

There are many navigable rivers. Nearly all of those in European Russia rise in an inconsiderable elevation near the center of the country, called the Valdai Hills. From these hills they descend in nearly every direction, emptying into the Arctic Ocean, the Baltic, the Black Sea and the Caspian. The longest of these rivers is the Volga, which, although it empties into the Caspian, is nevertheless of vast importance, since it is navigable through so large a part of European Russia. The Volga system has been connected by canals with adjacent river systems, and with Lake Ladoga, as well as by rail with the Don

at its nearest point. The Don and the Dnieper are large navigable rivers that flow into the Black Sea. Most of the northern plain and part of Asiatic Russia slopes gradually down to the Arctic, its rivers draining into this ocean.

Climate.—A large part of the area of the Russian Empire, especially east of the Urals, is unproductive because of the character of its climate, which is marked by great diurnal and seasonal changes of temperature. The rainfall, although not abundant, is in general sufficient for the needs of agriculture.

EUROPEAN RUSSIA

Area, 2,113,000 square miles. Population, 109,700,000. Density, 52

European Russia occupies the eastern half of Europe. Valuable fisheries exist on the coasts, and in some of the rivers. They are especially productive in the Volga and Ural rivers and in the Caspian Sea. From the eggs of the sturgeon and other fish, *caviar* is made. Vast quantities of herring are salted and other varieties of fish are sold frozen.

The sable, the ermine, and the marten are trapped in the forest region for their choice furs.

Minerals.—Although not fully developed, the mineral resources of this vast domain are enormous. The general distribution of minerals is shown in the map.

Coal and iron are mined in southern Russia in the valleys of the lower Donetz and Dnieper; in the neighborhood of Warsaw to less extent; south of Moscow; and in the Urals. The centers of the iron industry are the neighborhood of Ekaterinoslaf in southern Russia, where coke is had from the Donetz coal fields, and in the Urals, where wood is mostly used for smelting the ore. In Poland, where the iron and coal are found near together, the manufacture of iron and steel is beginning to assume importance.

In the production of petroleum Russia ranks next to the United States, these two countries furnishing the world's prin-

cial supply of this valuable material. The Russian supply occurs near the base of the Caucasus Mountains on the shores



FIG. 155. — Russia — Chief Cities, Ports, etc.

of the Caspian Sea, near Baku, at the north base, and at the western extremity near Kertch.

Gold is found on the eastern sides of the Ural Mountains in

quantities sufficient to place Russia fourth in the gold-producing countries of the world, and the mines are as yet but imperfectly developed.

Nearly all the world's supply of platinum comes from Russia. Lead, tin, zinc, and salt are also mined.

Agriculture. — Until 1861 most of the land belonged to the crown and to the nobles, while the peasants were serfs attached to the land. In 1861 the serfs were liberated and the peasants now own about one third of the land. It is held by villages (*mirs*) and allotted to individuals for a term of years. Since the emancipation of the serfs an enormous increase has taken place in the agricultural products, with a consequent increase in the value of the land.

Wherever the climate permits, agriculture is the principal industry, and the extent of country being so vast, a great variety of vegetable products exist.

The extreme northern part of Russia is covered with the frozen tundras, where only moss grows. South of this is a vast forest belt, composed largely of fir, pine, oak, and birch trees. Russia ranks third in importance among the nations of the world in the extent of its forests, and its timber is among the most valuable of its products.

South of the forest belt is the great agricultural region. Here the soil possesses a fertility unsurpassed by any other part of Europe. It is known as the "black earth" region, and extends from the valley of the Dnieper to the base of the Ural Mountains. The wheat crop in this region is exceeded only by that of the United States. One half of this crop is exported, comparatively little being required for home consumption, since the Russians live largely on rye.

The principal grain crops are wheat, rye, oats, and barley. Flax, hemp, potatoes, sugar beets, and tobacco also are raised in large quantities. In the southern part of the country near the Black Sea, Indian corn and grapes yield large crops.

Vast herds of sheep, together with cattle, horses, and hogs, are raised on the grassy steppes.

Manufactures.—These have rapidly developed in Russia during the last decade. Textile industries in cotton, wool, linen,

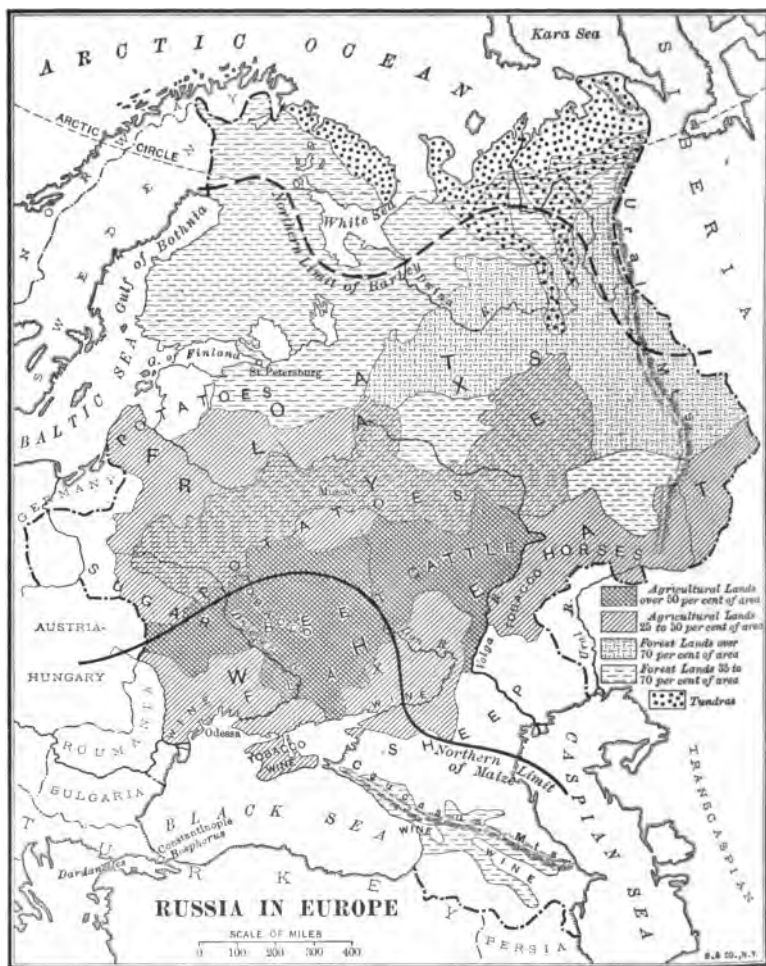


FIG. 156.—Russia—Agriculture and Forests.

and silk are among the most important. As a manufacturer of cotton cloths Russia now holds the fourth place among the nations of the world. One third of this raw cotton comes

from Russian territory. The rest comes mainly from the United States. Moscow with the surrounding country leads in the wool and silk industries. Breweries and distilleries are of importance.

At Kazan the famous Russian leather is manufactured.

Of the manufactures of Russia about one third are textile and one third food products.

Transportation Facilities. — In spite of the fact that the country consists practically of one vast plain, and the grading of transportation routes is an easy matter, the marshy character of much of the surface, together with the lack of such road-making materials as stone, renders the construction of roads difficult, and the roads are comparatively few in number and poor in quality. River communication, however, is excellent, most of the rivers being navigable throughout nearly their entire length, while many of them have been connected by canals. Their use, however, is prevented by the ice during part of the year. There are numerous railroads in the country, most of the important lines radiating from Moscow. The total railroad mileage of Russia in Europe is about 32,000. Some 60 per cent of these are under the control of the government.

The trans-Siberian Railroad connects St. Petersburg with Vladivostok, on the Sea of Japan, in Manchuria. This road can not fail greatly to benefit, not only the Russian Empire, but all other parts of the world by affording direct communication between the eastern and western parts of the continent, in an unbroken line of railway some 5000 miles long, from the Pacific on the east to the frontiers of Germany on the west.

Commerce. — More than half of the imports of European Russia and almost three fourths of the exports are sea-borne. The chief ports on the Baltic are *St. Petersburg*, *Cronstadt*, *Riga*, and *Revel*, from which large exports of flax, hemp, wheat, tallow, and timber are sent. *Odessa* is the most important port on the Black Sea. The grain export of south Russia is sent through this port, as is also much of the timber. *Batum* and *Novorossiysk* are important points for the shipment of petroleum.

Much petroleum from the Baku fields is also shipped across the Caspian and up the Volga.

Astrakhan is the chief port on the Caspian, and has large fishing industries. *Kief*, on the Dnieper, and *Warsaw* are great commercial centers of western Russia.

The exports of the Russian Empire, like those of the United States, greatly exceed the imports in value—in the proportion of 55 to 45. The details of this foreign trade are given in the table.

IMPORTS		EXPORTS	
Raw Cotton, Wool, and Silk	21 %	Grain and Flour (Wheat, Rye, Barley)	52 %
Crude Metals and Coal	10	Eggs and Dairy Products	8
Gums, Chemicals, and Colors	8	Other Food Products	3
Leather and Hides	4	Fowl, Horses, and Cattle	3
Other Crude Materials	13	<i>Food and Animals</i>	66 %
<i>Raw and Semi-raw Materials</i>	56 %	Flax, Hemp, and Wool	9
Machinery and Metal Goods	15	Timber	7
Textiles (chiefly Cotton)	3	Petroleum and Oils	6
Other Manufactures	10	Furs, Leather, Feathers, etc.	5
<i>Manufactures</i>	28 %	Flaxseed and Oil Cake	4
Tea, Liquors, Fish, and Other		<i>Crude Materials</i>	31 %
<i>Foods</i>	16 %	<i>Manufactures</i>	3 %
	100 %		100 %
FROM		To	
Germany	40 %	Germany	26 %
Great Britain	20	Great Britain	24
United States	8	Netherlands	13
France	5	France	7
Austria-Hungary	5	Italy	6
	78 %		76 %

Fairs.—At several places in the interior of Russia great fairs are annually held. To these places goods are brought in large quantities from all parts of Russia and countries of southern Asia by caravans and by boats. During the fair an immense quantity of goods changes hands. All the eastern nations, Russians, Chinese, Mongolians, and Persians, are interested in the traffic, and millions of dollars change hands every season. On the completion of the fair the city is left comparatively deserted. *Nizhni Novgorod* is one of the

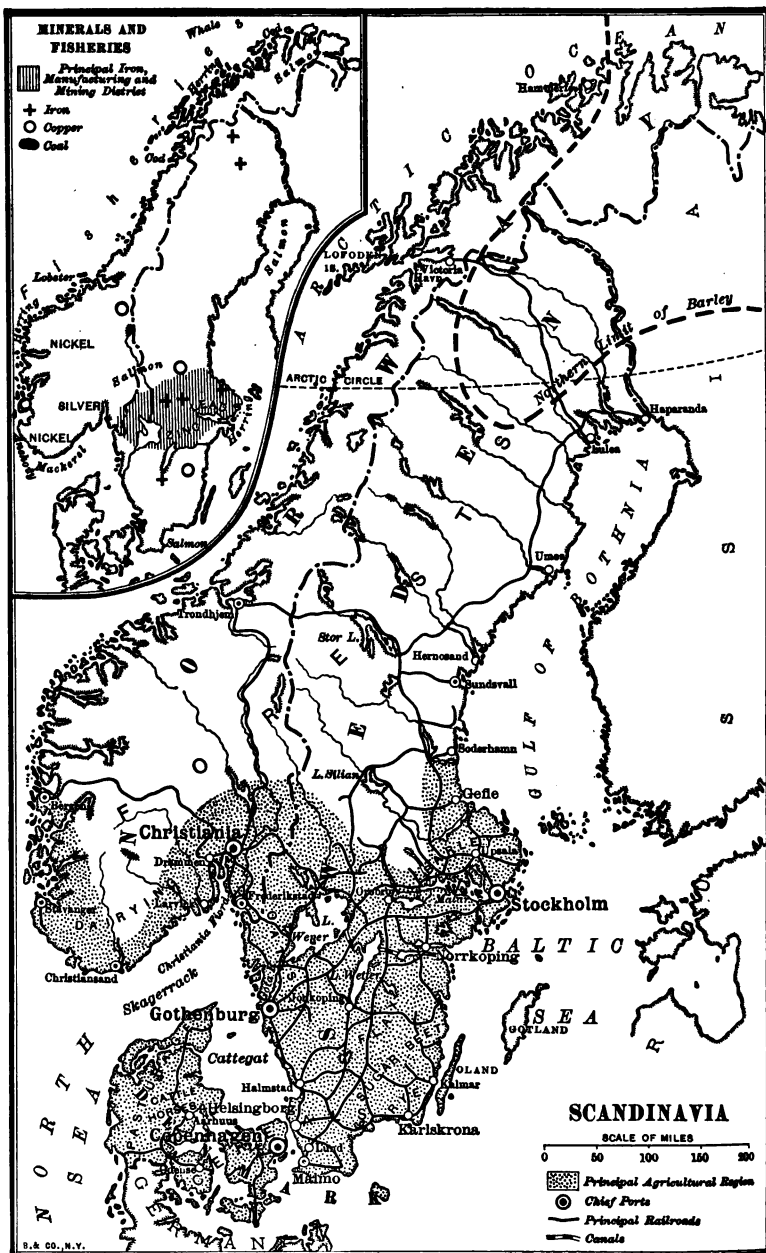
principal of these fair centers. The goods brought annually to this fair have a value of perhaps \$80,000,000, and consist largely of raw cotton and wool and other animal products from Russian and central Asia, which are exchanged for all sorts of manufactured goods from the western coast, as well as rice, coffee, tea, sugar, kerosene, etc.



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FIG. 157.— The Fair of Nizhni-Novgorod, Russia.

Colonies and Dependencies of Russia.— The dependencies of Russia consist of the khanates of Bokhara and Khiva in central Asia. The aggregate area is about 102,300 square miles and the population about 2,000,000.



CHAPTER XXX

SWEDEN, NORWAY, AND DENMARK

SWEDEN AND NORWAY

Sweden: Area, 173,000 square miles. Population, 5,100,000. Density, 30

Norway: Area, 124,000. Population, 2,220,000. Density, 18

The Kingdoms of Sweden and Norway occupy the *Scandinavian Peninsula* in the extreme northwestern part of Europe. The form of government in each country is that of a constitutional monarchy. The western slopes of the Scandinavian highlands are steep, and descend abruptly to the Atlantic, which penetrates the land in deep fiords. The eastern slopes descend gently to the Baltic, and afford considerable area for cultivation. The western coasts of the peninsula receiving the westerly winds from the Atlantic have a much milder and moister climate than the eastern slope, which is cut off from these winds by the high mountains of the west. The Swedish coast is unapproachable in winter on account of the ice, while the Norwegian coast is open all the year round.

Agriculture.—The highlands of Norway produce little but mosses and lichens, but the southeastern part, near Christiania, is warmer, and yields potatoes, oats, and barley. These crops, however, are raised in larger quantities in Sweden in the western and southern parts of the country. The agricultural products are insufficient to feed the people, so that food products form a large part of the imports.

Sheep are raised in parts of Norway and Sweden and many cattle in the southern part of Sweden. Large quantities of butter are exported to Great Britain from the latter country.

Forests. — About one third of the peninsula is covered with forests, which are especially heavy and continuous toward the north. Pine, fir, larch, birch, and oak are the predominating varieties. The forests are one of the most valuable resources of both countries.

Fisheries. — The fisheries of both Norway and Sweden are of great importance. Cod, herring, and mackerel are caught in enormous numbers along the coasts, particularly on the banks east of the Lofoden Islands. Cured cod and herring, and mackerel preserved in pickle, form important exports to southern European countries.

Mineral Products and Manufactures. — Norway has no mines of any great importance. Sweden, however, has mines of coal, iron ore, silver, lead, copper, and zinc, all of which are worked. A high grade of iron is smelted in eastern Sweden by means of charcoal obtained from the forests on the mountain sides. Large quantities of iron are shipped to Sheffield, England, steel made from Swedish iron being highly esteemed for cutlery.

Sweden has some manufactories of cotton and woollen goods, wood pulp, and matches, but these are not very large.

Transportation Facilities. — There are some 7700 miles of railroad in Sweden, and about 1500 miles in Norway. About one third of the railroads in Sweden and nearly all those in Norway belong to the state. The rivers of the peninsula are generally short and rapid, and are not, as a rule, navigable. The numerous lakes of Sweden, however, afford means for communication, and since they have been connected with one another by means of a ship canal extending to Stockholm, water communication is established between Stockholm and the port of Gothenburg on the Cattegat. This connection is of great importance, since Gothenburg, having a milder climate than Stockholm, is open most of the year, and is the great port of Sweden.

Commerce. — The people of the Scandinavian Peninsula, who have been sailors since the days of the Vikings, still hold very high rank as navigators. The merchant fleet of Norway ranks

next after those of Great Britain, the United States, and Germany, in tonnage, and in proportion to its population ranks first. Norwegian ships do a great deal of the carrying trade of other nations.

Of the foreign commerce of the peninsula about two thirds is Swedish. The imports consist chiefly of breadstuffs, machinery and metal goods, textiles, raw cotton and wool, and coal, and slightly exceed the exports. The latter consist chiefly of lumber, dairy products, and iron ore.

Stockholm is the most important commercial and industrial center of Sweden. It is situated in the mining and agricultural region, and is connected with the best waterways of the country. *Gothenburg* has a flourishing trade with Denmark.

The chief center of trade in Norway is *Christiania*, on Christiania Fiord, which has been connected both with *Trondhjem* and with *Bergen* by railroad. The latter city is the center of the herring fisheries.

The details of the foreign trade are given in the following table:—

SWEDEN

IMPORTS		EXPORTS	
Coal and Petroleum	15 %	Lumber and Pulp	45 %
Fibers and Textiles	14	Iron and Steel, Ore, and	
Machinery, Iron and Steel . .	11	Machinery	21
Cereals, Meat, and Fish . . .	10	Butter	10
Coffee, Sugar, Liquors, and Tobacco	7	Paper, Matches, and Glass . .	7
Wood and Paper	6	Fish	1
	63 %	Oats	1
			85 %
FROM		TO	
Germany	36 %	Great Britain	42 %
Great Britain	28	Germany	17
Denmark	14	Denmark	13
Russia	5	France	7
Norway	5	Netherlands	7
	88 %		86 %

NORWAY

IMPORTS		EXPORTS	
Machinery, Iron and Steel . . .	23 %	Lumber and Pulp	38 %
Cereals	17	Fish and Fish Oil	38
Bacon, Coffee, Sugar, and Liquors, .	17	Paper	5
Textiles, Rope, and Fibers . . .	14	Hair and Skins	5
Coal and Petroleum	11	Ores and Minerals	5
Tallow, Oils, and Tar	7	Metals and Ships	4
	89 %		95 %
FROM		To	
Germany	27 %	Great Britain	42 %
Great Britain	27	Germany	14
Russia	10	Sweden	9
Sweden	8	Spain	6
Denmark	7	Netherlands	6
	79 %		77 %

DENMARK

Area, 14,850 square miles. Population, 2,450,000. Density, 165

The kingdom of Denmark consists of the peninsula of Jutland and the adjacent islands, and lies north of the German Empire between the North Sea and the Baltic.

In the west, the peninsula is low, sandy, swampy, and fringed with sand dunes. Much of this region has, however, been rendered cultivable by planting wind-breaks, irrigating, and draining bogs. The eastern part of the peninsula and the islands east of it are diversified with low hills, and the clayey soil is fertile and well adapted to agriculture. Owing to its insular position Denmark has a mild and moist climate.

Agriculture and Pasturage.—Of the total area of Denmark 80 per cent is productive, of which less than half is in pasture and meadow. Stock raising is the most important occupation of the people. The products of the dairy form a large part of the kingdom's exports, the scientific dairy methods of Denmark having won for the country an enormous trade. In addition, eggs, pork, beef, live cattle, and horses are important exports.

Agriculture is also an important occupation. The chief grain crops are wheat, rye, and oats, yet vegetables and sugar beet are raised in considerable quantities.

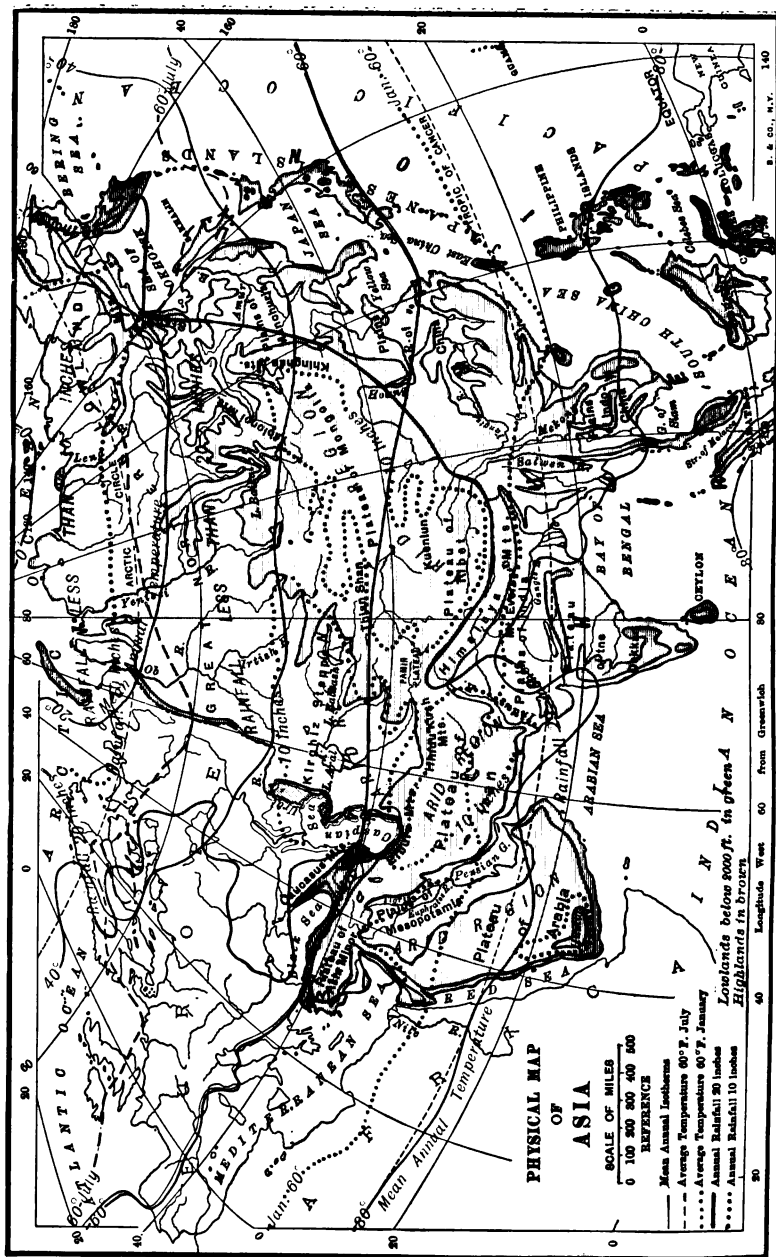
The mineral products are of but little value. Amber is sometimes found on the coasts of the North Sea.

Commerce.—The facilities for commerce are excellent, though, owing to her small population, the value of her own trade is small in comparison with her carrying trade for other nations.

There are no good ports on the western coast of the peninsula. *Copenhagen*, the capital, is the largest and the chief port of the kingdom. The details of the foreign trade are given in the table.

IMPORTS		EXPORTS	
Cereals (Corn)	14 %	Butter and Eggs	50 %
Oil Cake, Hides, and Wool .	14	Meat	25
Butter, Meat, Coffee, and Sugar	15	Horses and Cattle	7
Textiles and Fiber	10	Hides and Skins	3
Machinery, Iron, and Steel .	9	Barley and Wheat	2
Coal and Petroleum	8	Fish	2
	<u>70 %</u>		<u>89 %</u>
FROM		To	
Germany	29 %	Great Britain	60 %
Russia	17	Germany	18
Great Britain	16	Sweden and Norway	12
United States	12	Russia	4
Sweden and Norway	11	United States	4
	<u>85 %</u>		<u>98 %</u>

Colonies and Dependencies include the Faroe Islands and colonies in Iceland, Greenland, and the Danish West Indies. They have a total area of about 86,600 square miles and a population of about 121,000.



CHAPTER XXXI

ASIA. INDIA AND CEYLON

ASIA

Area, 17,000,000 square miles. Population, 906,700,000. Density, 53

Location and Surface. — Asia embraces nearly one third of the land area of the earth and extends from about 2° to 78° north latitude, a distance of over 5000 miles. Its greatest length is about 7000 miles from southwest to northeast.

The southern and eastern parts of Asia are high and mountainous, and the northern and western parts comparatively low and flat. Some extensive lowland plains are found also in the lower courses of the great rivers that empty into the Pacific and the Indian oceans, such, for example, as the Amur, the Hoang, the Yangtze, the Mekong, the Ganges, the Indus, the Tigris, and the Euphrates.

The central region is occupied by a vast and continuous highland, extending from the Red and Mediterranean seas to Bering Strait. This highland is bordered and traversed by lofty mountain ranges and broken into comparatively level plateaus differing greatly in altitude. Among them are the plateau of Mongolia, of Tibet, of Pamir, of Iran, of Asia Minor, and of Arabia. Many of the mountain ranges are exceedingly high. The Himalayas contain Mt. Everest, the highest point of land in the world.

The great low plain north of the highland is a continuation of the great plain of European Russia. It has a general elevation of less than 1000 feet, and, in the neighborhood of the Caspian Sea, it sinks below the level of the ocean. In Fig. 159 the green represents lowlands and the brown highlands.

Climate and Resources. — The climate of Asia as a whole, owing to the extent and configuration of the grand division, is

one of great extremes. In the northern lowland and on the central highland the winters are bitterly cold and the summers are hot; while south and southeast of the highland, though the temperature is tropical or semi-tropical throughout the year, the monsoon winds from the ocean make the summers very rainy, while the land monsoon in winter makes that a dry season.

In winter the temperature of the greater part of the northern lowland is far below zero, but in July the isotherm of 60° lies north of the Arctic circle. Thus, as the rainfall, though slight, occurs mostly in the spring and summer months, the greater part of the northern lowland is a forest region, and good crops of grain and vegetables can be raised in much of it, in spite of the long, cold winters.

The great central highland, however, with its border of high mountains, and the lowland region east of the Caspian, receive very little rainfall at any season. Consequently they are either grazing regions or extensive deserts, unsuitable for agriculture except where water is available for irrigation, as in the neighborhood of snow-fed rivers from the mountains.

The lowland regions south and southeast of the highland, with their moderate and equable temperature, and ample monsoon rains, have a rank vegetation, and yield all kinds of tropical and semi-tropical produce, as rice, tea, sugar, opium, cotton, coffee, millet, and even wheat and other grains.

Hence the southern and eastern parts of Asia are densely peopled and are of great commercial importance, while the central highland, and to scarcely less extent the northern lowland, have a very sparse population, and are as yet of but little commercial importance.

INDIA

Area, 1,790,000 square miles. Population, 298,000,000. Density, 167

Location and Surface. — India includes the great peninsula of Hindustan and Burma on the eastern coast of the Bay of Bengal. It extends north to Tibet, Chinese Turkestan, and Pamir plateau, and west to Afghanistan and Baluchistan. It is

the most important commercial country of Asia. The greater part of India is under the control of a governor general or viceroy, appointed by the king of England. The country is divided into presidencies and provinces, acknowledging the king of England as the emperor of India. Scattered among these

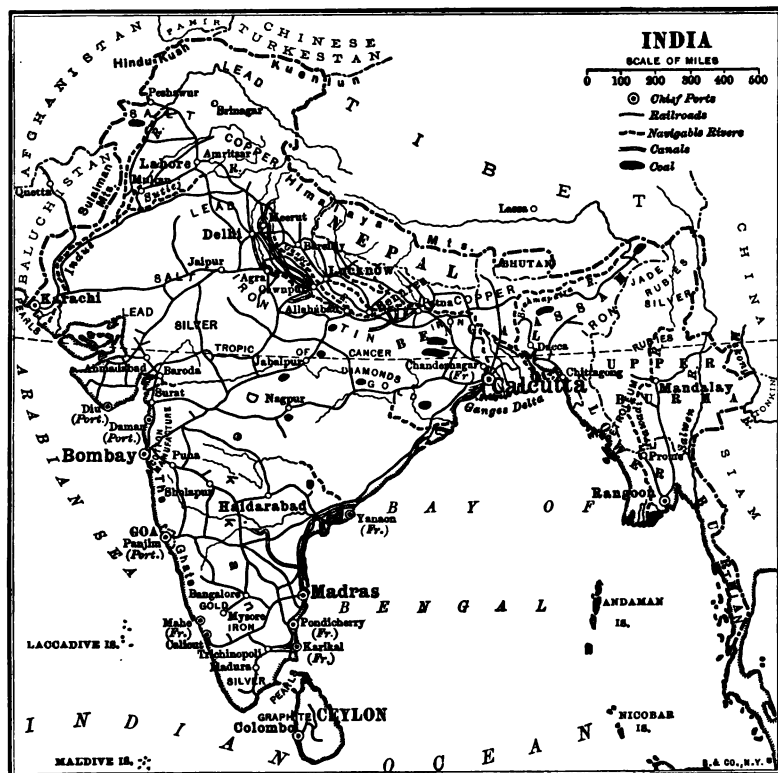


FIG. 160. — India — Chief Cities, Routes, and Minerals.

are tributary states under the nominal control of native rulers, but actually subject to British influence. The small territory of Goa on the western coast, together with two other settlements, belong to Portugal; and a still smaller area, including Pondicherry and other settlements on the eastern and western coasts, belongs to France.

Surface Structure. — India is practically isolated from adjacent countries by high mountain ranges; the Sulaiman Mountains on the west, the Pamirs, Kuenlun, and the Himalayas on the north, and the ranges of Indo-China on the east. Although readily accessible by sea, India has comparatively few good harbors.

In the northern part of the country there is a great plain, which lies immediately south of the Himalaya Mountains, and reaches across the country from east to west, from the mouths of the Ganges-Brahmaputra system to the mouths of the Indus. South of this plain and occupying most of the peninsula is the Dekkan table-land. This plateau falls off gradually to a low coast plain of moderate width on the east, but on the west is bordered by a mountain range called the Ghats, which rises abruptly from the coast.

Climate. — There are three seasons in India: the hot, the rainy, and the cool. Since India lies mainly in the tropics, its temperature outside of the mountain districts is generally high. The hottest season of the year is from March to May inclusive, during the change from the northeast to the southwest monsoons, and before the "bursting" of the southwest monsoon. The rainy season extends from June to October inclusive. During this season the western slopes of the Ghats, the hills of Assam, and the plains of the Ganges delta receive heavy rains and the greater part of the northeast fairly heavy rains. The region east of the Ghats and a large part of the valley of the Indus are almost rainless. The cool season extends from November to February inclusive. This is the rainy season for the southeastern plains.

While the rainfall of India is very great, yet it is uncertain over a large part of the country, so that it is not unusual for the rainfall to be too small for the crops. Then severe famines occur, and a frightful mortality results. It is for this reason that extensive systems of irrigation have been constructed, including reservoirs in which to store the water in times of rain. One of the causes which contribute to the heavy mortality in times of

drought is the fact that the religion of a large part of the people prohibits them from eating meat, so that when the crops fail, they have absolutely nothing to eat.

Density of Population. — The most thickly settled part of this densely populated country is the valley of the Ganges, where the soil is rich and the rainfall abundant.

Agriculture. — India is almost exclusively agricultural, nearly three fourths of all the males in the country being engaged in this calling. Agriculture is crudely carried on, yet in all regions where the rainfall is good, the crops are enormous. The dense population does not permit very large farms for each individual, the average being less than five acres to each farm. Over the greater part of the country two crops are raised each year.

Irrigation is generally practiced in India. The irrigation works are, perhaps, the most extensive in the world, supplying water in the aggregate to nearly 19,000,000 acres (29,000 square miles) of land in the Ganges Valley and the Dekkan region.

The valley of the Ganges produces rice, tea, and opium. Next to that of China the rice crop of India is the greatest in the world, the largest crops being raised in Burma, on the eastern coast of the Bay of Bengal. Nearly half the rice is raised in this district.

Wheat is quite extensively raised in northern and central India, about one tenth of the cultivated area being devoted to this grain, and the crop amounting on the average to about one third the wheat crop of the United States. This allows a surplus for export of about 20,000,000 bushels in average years. But the exportable surplus varies greatly according to the season, and in years of drought, such as 1901, wheat was largely imported.

South of the wheat region lies the great cotton belt of India. Here is the famous black soil of great fertility, derived from the decomposition of basalt rock. This soil is said to have produced crops for thousands of years without fertilizers. Besides its marked fertility, it possesses the valuable property of retaining water, thus making it of great value in a region where the rainfall is at times apt to be scanty. India comes next to the United

as yet been well developed. There are a number of coal fields, and iron ore exists in great quantities, but limestone is scarce, so that smelting is done on a small scale and with charcoal, on account of the poor quality of the coal. Niter or native salt-peter occurs. Petroleum has also been found. Rubies of great value are found in Burma.

Manufactures. — The manufactures consist mainly of cotton cloth, about half the cotton crop being consumed in home manufactures. Calico (from the port Calicut) and fine hand-woven muslins were at one time important articles of export, as were also silks, shawls, and rugs, but these are not made in very large quantities at the present time. The caste system interferes with the spread of manufacturing, since changes of occupation are discountenanced.

Bombay is the center of cotton manufactures, and the manufacture of gunny bags and other articles made of jute. The silkworm is raised extensively in the Punjab, Assam, and lower Bengal. Silk manufactures are carried on in Bengal and elsewhere. In addition to these there are breweries, woolen manufactories, tanneries, and numerous home industries.

Transportation. — Excellent transportation facilities are afforded by a system of 27,000 miles of railway, 38,000 miles of turnpike roads, and about 150,000 miles of other roads, besides, in southern India, a number of canals. The principal rivers are the Indus, the Ganges, the Brahmaputra, the Irawadi, and the Salwen. The Indus and the Ganges though navigable have no regular steamer service, being paralleled by railways, but the Brahmaputra and the Irawadi are extensively used as commercial routes. As a rule, most of the other rivers of India are not navigable for any great distances. During the rainy season they are impetuous torrents, but during the dry season they contain only a small amount of water.

Commerce. — India has a small commerce in proportion to its great population, but its foreign trade is twice as great as that of any other Asiatic country, and about equals that of Italy in value. The exports are greatly in excess of the imports (61 : 39).

At least one third of the raw cotton goes to Great Britain. Enormous quantities of opium are exported to China.

The details of the foreign trade are given in the table.

IMPORTS		EXPORTS	
Textiles and Clothing . . .	42%	Raw Cotton and Wool . . .	21%
Metals, Machinery, etc. . .	16	Rice and Wheat	19
Sugar	6	Jute and Silk	15
Provisions	6	Oil Seeds	11
Petroleum	3	Tea and Coffee	7
Glass, Ivory, and Jewelry . .	3	Hides and Skins	6
Chemicals, Dyes, and Drugs .	3	Opium	6
	79%	Dyes, Tannin, and Lac . . .	3
			88%
FROM		To	
Great Britain	60%	Great Britain	25%
Belgium	4	China	12
Russia	3	Germany	8
Austria-Hungary	3	United States	7
Straits Settlements	3	Egypt	6
China	3	France	6
Germany	2	Japan	5
	78%		69%

Chief Ports. — *Calcutta* is the largest city and the chief port of India. It carries on 35 per cent of the foreign trade and is the center of business in Bengal. *Bombay* has a large and safe harbor, and carries on about 29 per cent of the foreign trade. Since the opening of the Suez Canal and the building of the railroads up to the Ganges Valley, *Bombay* is rapidly becoming a rival to *Calcutta*.

Madras, though the third city of India, has no harbor, but merely a roadstead, where cyclones are a menace to the shipping, and is exceeded in foreign trade by both *Rangoon*, in the delta of the Irawadi, and *Karachi*, in the delta of the Indus.

The language is various. Hindi and Bengali are most spoken.

CEYLON

Area, 25,000 square miles. Population, 3,600,000. Density, 144

The island of Ceylon, south of India, is a separate British colony. The climate is tropical. Both the northeastern and the southwestern monsoons bring rain, so that the rainfall is abundant, and the island supports a luxuriant vegetation, except in the extreme northern part.

Very valuable deposits of graphite occur, and are extensively worked. Tea and cocoanuts are the principal agricultural products. Ceylon ranks as the third tea-producing country in the world. Rice, coffee, cacao, spices, cinnamon, and cinchona are also produced.

Three fourths of the foreign trade is with Great Britain and India. The imports consist of rice (38%), coal, cotton, fish, and curry; the exports are tea (55%), cocoanut products (20%), and graphite (11%). *Colombo* is the principal port.

CHAPTER XXXII

INDO-CHINA AND THE EAST INDIES

INDO-CHINA

The peninsula of Indo-China lies between the China Sea and the Bay of Bengal, and exclusive of Burma, has an

area of about 500,000 square miles, a population of about 22,000,000, and a density of about 44. It includes in the central part the native kingdom of Siam, which serves as a "buffer state" between the French possessions, Cochin China, Cambodia, Anam, and Tonkin in the eastern part of the peninsula; and the English possessions, Burma in the west, and the Straits Settlements in the extreme south.

The peninsula is traversed by mountain ranges trending north and south, which are separated by broad and fertile river valleys. The climate is



FIG. 162. — Indo-China — Chief Cities, Routes, and Products.

moist and tropical. Much of the surface is clothed with dense forests and jungles.

Siam. — Rice, raised in the valley of the Menam River, is the chief article of food. The size of the crop depends on the rise of the river for irrigation purposes. The forests produce teak wood, the logs being floated down the Menam River to Bangkok for reshipment to London. Some tin and gold are mined.

Bangkok, the capital and only large city, is the commercial center, but large steamers are prevented by the bar from reaching its wharves.

Railroads are being extended into the interior. Rice is by far the most important export, Siam, Cochin China, and Burma being the great rice-exporting regions of the world. Teak logs and pepper are also valuable exports. Most of the trade is through Singapore and Hongkong.

French-Indo China, including the French sphere of influence in Siam, has an area of about 360,000 square miles. The surface is more elevated and mountainous and the climate less moist than in Siam. All kinds of tropical products abound, as well as coal and iron, though the great natural resources are not extensively developed. Rice, grown in Cochin China and Cambodia and shipped from the fine port of *Saigon*, is the most valuable export, but fish, pepper, spices, sugar, cotton, tobacco, cardamons, copra, and hides are also exported.

Hanoi and *Haiphong* are the commercial centers in Tonkin, and *Tourane* is the best of the few good harbors on the mountainous coast of Anam. Short railroads have been built from each of these towns. The foreign trade amounts to about \$64,000,000. About half of the imports come from and about one sixth of the exports go to France or its colonies.

The Straits Settlements occupy the extreme southern part of the Malay Peninsula and belong to Great Britain. The location of the colony gives it great commercial importance, because much of the commerce between eastern Asia and the west passes through the Strait of Malacca.

Singapore, on an island at the southern end of the strait, and *Georgetown*, on Penang Island at the northern end, do an annual business of about \$300,000,000 in goods imported from various parts of the world, sold and exported to other parts of the world. Rice is the greatest import, and then come cotton goods and opium, fish, coal, tobacco, and petroleum.

The most important export is tin, from the adjacent mainland and islands, which is shipped in greater quantities from Singapore than from any other port in the world. Other important exports are gums for varnish, spices, gambier for tanning, copra, tapioca, and rattans. The movement of the foreign trade is shown in the table.

IMPORTS FROM		EXPORTS TO	
Malay Peninsula and Islands .	25%	Great Britain	20%
India	21	Dutch East Indies	16
Dutch East Indies	14	Malay Peninsula and Islands .	13
Hongkong and China	12	United States	13
Great Britain	10	Siam and India	11
Siam	8	Hongkong and China	7
	<u>90%</u>		<u>80%</u>

THE EAST INDIES

The East Indies, or the Malay Archipelago, comprise a vast number of islands scattered over an area of tropical and equatorial sea 2500 miles long from the Malay Peninsula to the island of New Guinea, with a width of 1900 miles. The principal islands or group of the archipelago are the Sunda Islands (Sumatra, Java, Sumbawa, Flores, and Timor), Borneo, Celebes, the Moluccas, and the Philippines. All of the islands have fertile soil and a humid, equable, tropical climate, and hence most of them are covered with forests and a rank vegetation. The forests of Borneo and Sumatra contain such valuable trees as ebony, gutta percha, rubber, and camphor. The islands near the equator have rains throughout the year, but those lying farther from the equator have a well-marked rainy season, which

south of the equator lasts from January until March, but north of the equator occurs during the summer months. With the exception of the Philippines, which belong to the United States, the eastern half of Timor, which belongs to Portugal, and the northern and northwestern parts of Borneo, which belong to Great Britain, the whole Malay Archipelago belongs to the Netherlands.

The Dutch East Indies have a combined area of 585,000 square miles and a population of about 35,000,000. More than three

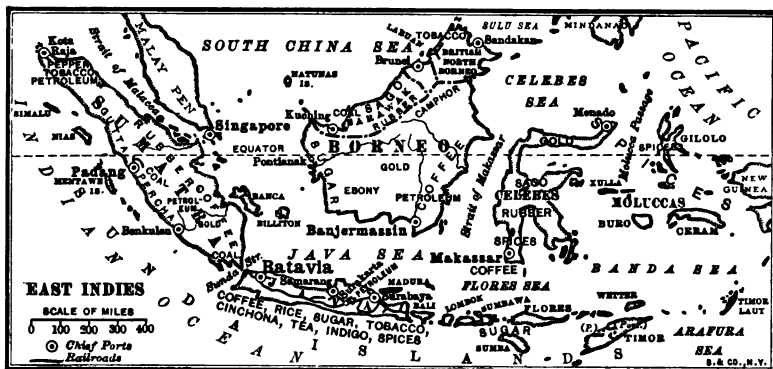


FIG. 163. — East Indies — Chief Cities, Railroads, and Products.

fourths of the population live on the islands of Java and Madura, which have a density of population of 575 per square mile and are commercially the most important of the Dutch East Indies.

These islands have been cleared of forests to a considerable extent and brought under a most extensive system of cultivation. Rice, sugar cane, and tobacco are characteristic products of the lowlands; coffee of the regions of moderate elevation, and tea of still higher regions. Java coffee is of great excellence and is highly prized in the markets of the world, Java ranking next after Brazil in the amount of coffee exported. Indigo, cinchona, and spices are also important exports.

Sumatra raises large quantities of tobacco, which forms the chief export. Celebes produces large quantities of coffee, the culture of which, as in Java, is under government control.

The two small islands of Banca and Billiton produce a large part of the world's supply of tin. Java has coal mines and oil wells, and coal is also mined in Borneo and Sumatra.

Steamship lines connect Java with the Netherlands, Great Britain, France, Australia, and China. The principal trade of Java is with the countries above mentioned and with the United States. There are about 1400 miles of railroad in the islands. *Batavia*, the capital of the Dutch East Indies, is the chief commercial port for all the islands.

British Borneo (North Borneo, Brunei, and Sarawak) has an area of about 88,000 square miles and a population of 800,000. Tobacco, coffee, and pepper are largely cultivated and exported, together with edible birds' nests, and such forest products as beeswax, dammar for varnish, and gutta percha. Some gold, coal, and antimony are mined. The chief ports are *Sandakan* in the north and *Kuching* in the south. Most of the trade is with Singapore.

THE PHILIPPINE ISLANDS

The Philippine Islands, belonging to the United States, include some 3141 islands, lying between 5° and 20° north latitude, and having a combined area of about 115,000 square miles. The principal islands are: Luzon, about as large as Ohio; Mindanao, but little smaller than Luzon; Samar, Negros, Panay, Paragua, and Mindoro, each approximately as large as Connecticut. The population is 7,636,000, mostly of Malay origin. There are 41,000 Chinese and 14,000 white people in the islands.

The volcano of Mayon, near the southern part of Luzon, one of several volcanoes in the Philippines, is nearly 8000 feet high, and is frequently in eruption. Earthquakes are common.

The year is divided into a cool, a warm, and a wet season. At Manila the mean annual rainfall is about 75 inches, occurring mainly during July, August, and September. The trade winds blow from November to June from the eastward. During the rest of the year the southwest monsoon prevails. The northern islands lie in the track of the typhoons.

Natural Resources and Industries. — Dense forests of valuable hard woods cover the interior of the islands. They are so heavy, however, that transportation is very expensive, and so hard that special tools are required to dress and work them. The bamboo here reaches the height of fifty feet. This wood forms the principal material employed for the frames of the native houses, as well as for the construction of agricultural and household implements. There are many excellent harbors.

With the exception of the manufacture of cigars, the industries of the people are mainly agricultural. The principal products are Manila hemp, copra, sugar, tobacco, rice, gums, and indigo. Manila hemp, from which most of the world's cordage is made, is not a true hemp, but consists of the fibers of a species of banana. It is produced on a few islands only. It forms by far the most valuable export.

Commerce. — *Manila* on Manila Bay, on the island of Luzon, is the principal city and seaport. *Iloilo*, on Panay, and *Cebu*, on the island of that name, are also important ports. The commerce of the Philippine Islands amounts to about \$66,000,000, the exports and imports being about equal. One fourth of the trade is with the United States, one fourth with



FIG. 164. — Philippine Islands — Chief Cities, Railroad, and Products.

Great Britain, and a smaller proportion with other countries. The exports to the United States consist almost entirely of hemp. Tobacco, cigars, and copra are the chief exports to Europe.

The means of transportation or communication through the islands are, as yet, scanty. The roads are poor except in the neighborhood of the coast. There is but a single railroad, about 120 miles in length, extending from Manila to Dagupan. There are some 720 miles of land telegraph lines besides the submarine cables between the islands and connecting them with Hongkong and the United States.

CHAPTER XXXIII

THE CHINESE EMPIRE

The Chinese Empire includes China proper, Mongolia, Manchuria, Chinese Turkestan, and Tibet.

CHINA PROPER

Area, 1,500,000 square miles. **Population,** 407,300,000. **Density,** 272

Location and Surface.—China proper occupies the southeastern part of the Chinese Empire, and includes about one third of its total area. Fully one third of the enormous population live on the low river plains. Since the area of China proper is less than half that of the United States, it will readily be seen that these plains must contain the densest population in the world. The Chinese are industrious, patient, and intelligent, yet their country is so crowded that no great progress has been possible. They use a language that has no alphabet, and in which each character stands for a syllable or a word; and this, coupled with the fact that these people are unwilling to adopt anything new, has caused the Chinese people, although among the first races in the world to become partly civilized, to remain to-day in practically the same condition in which they were many hundreds of years ago. Of late years, however, they have shown a willingness to enter into limited commercial relations with foreign nations, which would seem to promise much for their future.

Surface Structure, etc.—An alluvial plain covers nearly all the eastern part of China except on the southeast. West of the great plain there is an elevated section, becoming high and mountainous on the confines of Tibet. All parts of the alluvial

plain, and even some of the higher country, is covered with an exceedingly fertile yellow soil, which is light and easy to cultivate, and yields large crops when supplied with sufficient water. It is, however, very porous, and requires much water.

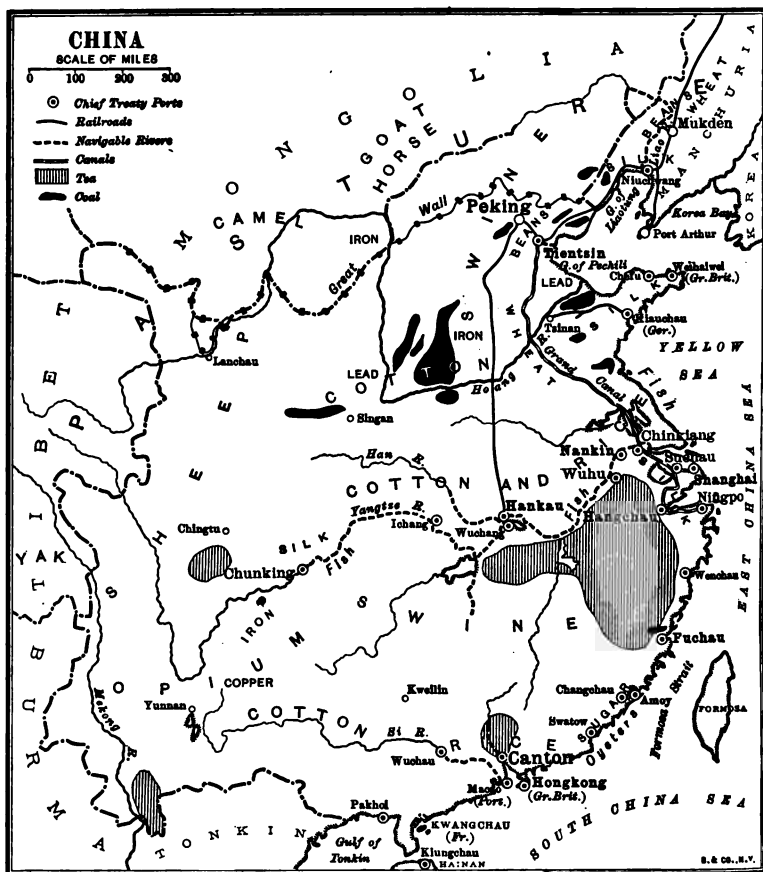


FIG. 165. — China — Chief Cities, Routes, and Products.

Consequently, in all parts of the country irrigation is extensively practiced. There is, in other sections of the country, a red soil that is also very fertile.

The summers are hot and the winters cold. By reason of the

monsoons, the rains are much heavier during the summer than during the winter, thus giving well-marked wet and dry seasons. Where the rains are plentiful, the fertile soil insures a very rich vegetation. The same rainfall causes, at times, the rivers, and especially the Hoang, to overflow the river plains, and during such floods great numbers of the inhabitants are drowned. The Hoang is, for this reason, sometimes called "China's sorrow." This river is too rapid, changes its course too frequently, and is too much obstructed by sand bars to be of much value for navigation. The Yangtze, however, is navigable for nearly 1000 miles from its mouth. There are numerous smaller rivers, which, together with the extensive system of irrigation canals, render internal communication between all parts of the plain easy. The Great Canal extends for 700 miles over a large part of the plain.

Natural Resources. — The forests have been removed in order to increase the area of cultivable land. The bamboo, however, which thrives on the plains of China, supplies a hard light wood suitable for houses, bridges, furniture, and household articles.

An oak tree, called the wax tree, supplies a variety of wax produced by an insect. The raising of animals is not of great importance, since, as in India, the religious beliefs of many of the people do not permit them to eat meat. Poultry, however, is raised in great quantities.

The fisheries, both off the coasts and in the rivers, are very productive and valuable. The breeding of fish in the rivers is extensively carried on.

The coal deposits, both bituminous and anthracite, are large, probably the most extensive in the world outside of the United States, but comparatively little is mined. Iron is abundant near some of the coal fields, and valuable deposits of copper occur. Government concessions to England to work some of the coal mines and to France to work the iron mines will doubtless increase the value of these products.

Agriculture and Occupations. — The land in China is all freehold, and held by families on the payment of an annual tax.

Agriculture is held in the greatest esteem, the farmer ranking next to the scholar in the social scale, and higher than the merchant and the artisan. The implements of agriculture are crude, and but a small amount of land is allotted to each farmer. This



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FIG. 166. — Unloading Tea at Hankau, China.

land, however, is tended with such great care and patience, and irrigation and fertilization are so well developed, that large quantities of rice, wheat, barley, maize, tea, opium, silk, sugar, indigo, and cotton are raised. As to the exact amount of tea that is raised but little is known. Since China is a great tea-drinking

country, and yet exports much tea, this crop must be very large. Silk is produced in nearly all the provinces. The largest amount, however, comes from the lower valley of the Yangtze. Here silk forms the important article of export, although about one half of this product is manufactured at home into silk fabrics that are generally made in the houses of the people on hand looms.

Tea comes next to silk in value as an export. Russia is one of the principal importers. Tea was formerly carried into that country by camel caravans or on sledges during the winter, but it now goes over the trans-Siberian Railroad. The tea trade of China has suffered greatly in late years by competition with Ceylon and India, both of which countries now export more tea than China. The great tea market of China is situated at Hankau, nearly a thousand miles up the Yangtze.

Manufactures.—The manufactures of China include iron, porcelain or "China" ware, silk, rhia fiber or Chinese grass, and firecrackers. The Chinese, who are very conservative, have not yet learned to appreciate the advantages of subdivision of labor. Steam machinery for textile manufactures has recently been introduced by European influence, but most of the cloth is still made by the women in their homes. Cotton mills have recently been erected in Shanghai, and machines for winding silk from cocoons in Shanghai and Canton.

Commerce.—The roads are poor and almost impassable for vehicles, and men do the work of beasts of burden. As yet only 1200 miles of railroad have been built in China proper. Domestic commerce is therefore restricted. There are, however, about 14,000 miles of telegraph lines, including those in Manchuria. The exclusiveness of the government and its great reluctance to admit foreigners have as yet tended to limit foreign commerce. But since 1878 a number of ports have been open to foreign trade and a number of rivers to foreign steamers, and the government has consented to the building of a few railroads, so that the improvement of the country has begun. There are now open to foreign trade some thirty-four Chinese ports situated

near the coasts and the rivers. Of these *Shanghai*, near the mouth of the Yangtze, has by far the greatest foreign trade. *Canton* and *Tientsin* are other treaty ports having a large foreign trade. It is estimated that there are now about 19,000 foreigners living in the open ports, mostly British, Japanese, and Americans. About half of them are at Shanghai. Canton, the largest city in China, is the greatest seaport of the southern part of the empire. Here hundreds of thousands of natives live in boats on the river. The table gives the details of the foreign trade.

IMPORTS		EXPORTS	
Cotton Goods	40%	Silk (raw and manufactured) .	37%
Opium	11	Tea	11
Rice	8	Raw Cotton	6
Sugar	7	Hides and Skins	5
Petroleum	4	Beans and Bean Cake	5
Metals	3	Straw Braid and Mats	4
Raw Wool and Cotton	2	Paper	1
Coal	2	Sugar	1
	<u>77%</u>		<u>70%</u>
FROM		To	
Hongkong	41%	Hongkong	39%
Great Britain	18	Continental Europe (except	
Japan	11	Russia)	19
India	10	Japan	13
United States	9	United States	12
Continental Europe (except		Russian Empire	5
Russia)	6	Great Britain	5
Indo-China and East Indies .	3	Indo-China and East Indies .	4
	<u>98%</u>		<u>97%</u>

China has granted on long leases Weihaiwei and the coast opposite Hongkong to Great Britain; the Bay of Kwangchau to France; Kiauchau to Germany; and Macao to Portugal. In 1898 Russia obtained a lease of Port Arthur for twenty-five years, connected this port by rail with the trans-Siberian Railroad, and closed the port to all vessels except the Russian and Chinese. Port Arthur was captured from Russia by the Japanese in 1905.

Hongkong, an island at the mouth of Canton River and about 40 miles from Canton, although a British colony, is virtually a sea-port of China, since it handles about 40 per cent of China's foreign trade, both the imports and the exports passing to their destination after a resale and reshipment by Hongkong merchants. Thus Hongkong may be considered as the great center of Chinese foreign trade, and indeed of the foreign trade of the far East in general.

It is estimated that about half the import and export trade of Hongkong is with Great Britain, hence the real share of that country in the foreign trade of China is much greater than is indicated in the table above.

At the ports of Hongkong, of which *Victoria* is by far the most important, are entered and cleared each year about 26,000 vessels, including Chinese junks. These represent a greater tonnage than that of the foreign trade of the port of London.



FIG. 167. — Hongkong.

CHINESE EMPIRE OUTSIDE OF CHINA PROPER

North and west of China proper lie the enormous areas included within the boundaries of Manchuria, Mongolia, Chinese Turkestan, and Tibet; and all of these, because of a direct or indirect control by China of their political affairs, are regarded as forming a part of the great Chinese Empire. Within this immense territory there are naturally great differences of relief and climate, and yet its contribution to the world's trade is so slight that it is scarcely worth mentioning.

Manchuria is, on the whole, the most important, not so much for what it is as for what it may become. It is crossed by the trans-Siberian Railroad and is coveted by Russia. The surface

is in the main hilly, though there are some large plains where the soil is very fertile and yields large returns when cultivated. The forests are important, and there is much undeveloped mineral wealth. Herds of cattle, sheep, goats, horses, and camels are raised, and live stock, wool, and hides are the chief exports.

Most of **Mongolia** is a dry and arid plateau, and **Chinese Turkestan** is largely a desert whose single important export seems to be jade, a green stone or mineral much prized by the Chinese.

Tibet is a high, isolated plateau, probably the highest in the world. Through the influence of the Buddhist priests, it has been closed for centuries to the "foreigner." Recently, however, it has been penetrated by a British expedition, though not with the idea of developing trade relations. Such commerce as is carried on is mainly with China, and consists in exchanging gold, musk, and skin for brick, tea, cotton goods, etc.

CHAPTER XXXIV

JAPAN AND KOREA

JAPAN

Area, 161,150 square miles. Population, 46,500,000. Density, 289

The Empire of Japan comprises a great island chain, extending from Kamchatka to Formosa, that is, from about 50° N. lat. to about 22° N. lat. Hondo, Yesso, Kiushu, Shikoku, and Formosa are the principal islands. The southern half of the island of Sakhalin also belongs to Japan. About three fourths of the people live on the island of Hondo, although the islands of Kiushu and Shikoku are also densely populated.

Structure and Climate. — The Japanese islands are the exposed tops of a mountain range that rises from the depths of the Pacific. They are strongly volcanic in character. The chief range forms the backbone of the main islands, but from this central system spurs reach the coast and contribute to the formation of beautiful land-locked harbors. The range of temperature through the long island chain varies from arctic cold in the north to tropical heat in Formosa. There is an abundant rainfall which comes chiefly in a well-marked wet season from April to September.

The mountain slopes are clothed with an abundant forest growth. Pine, chestnut, oak, and several varieties of cypress furnish valuable woods. The wax from the wax tree is employed for candle making and for coating paper. The mulberry, the lacquer tree, and the camphor tree are found over much of the empire, the camphor industry being developed especially in Formosa.

The empire is rich in minerals, especially coal and copper. Yesso has vast stores of coal which are now being extensively

common. The principal crops are rice, tea, cotton, barley, rye, and silk. Rice figures both as an export and an import, the rice raised in Japan being of so superior a quality that it is in great demand abroad, while a cheaper variety is imported for home consumption.

Since 1854, when Japan, through the efforts of the United States, opened her ports to the world, she has adopted occidental civilization with amazing rapidity. Machinery has been introduced into the country, and silk and cotton textiles are now manufactured. Other manufactures are being rapidly developed. The merchant marine of the empire is growing, foreign trade is increasing, and Japan appears destined to become an important factor in the commerce of the world. There are railroads on all the larger islands, including Formosa, the total railroad mileage being about 5000. The railroad system of Hondo is quite complete.

IMPORTS		EXPORTS	
Raw Cotton	28 %	Silk (raw and manufactured) .	43 %
Iron, Steel, Machinery, and Ships	13	Cotton (yarn and manufactured)	11
Textiles	11	Coal	6
Rice, Flour, and Beans . . .	9	Copper	5
Sugar and Wines	8	Tea	4
Petroleum	5	Straw Braid and Matting . .	4
Drugs, Dyes, and Paints . .	5	Matches	3
Fertilizers	4	Rice and Flour	2
	83 %		78 %
FROM		TO	
Great Britain	17 %	United States	30 %
British India	17	China	17
United States	17	France	10
China	14	Hongkong	10
Germany	9	Great Britain	7
Korea	3	Italy	5
Belgium	2	Korea	4
	79 %		83 %

Yokohama, which has a splendid harbor, is one of the principal ports, and transacts more than half the foreign trade of the

empire. It is near *Tokyo*, the capital and principal city of the empire. *Osaka* is the largest manufacturing city. *Kyoto* carries on extensive manufactures of small articles. *Kobe* on Hondo and *Nagasaki* on Kiushu are other important seaports. The latter is a very important coaling port. The language of the people is Japanese, although English is employed to a great extent in commercial transactions. The details of the foreign trade are given in the table. The trade with the United States is greater than that with any other country.

The principal exports of Formosa have an annual value of about \$10,000,000 and consist chiefly of tea, sugar, and camphor. *Tamsui* is the chief port.

KOREA

Area, 84,250 square miles. Population, 9,670,000. Density, 115

Korea, a native kingdom under Japanese influence, occupies a peninsula half again as large as Florida, which extends south-eastward towards Japan. It is separated from Japan by Korea Strait, about 100 miles wide.

As a whole the peninsula is rough or mountainous. The principal range lies near the eastern coast, is forest-covered in the north, and is rich in undeveloped deposits of coal, iron, and copper, though gold is sparingly mined in several localities. In the narrow eastern coast plain, and in the much wider plains and valleys of the west, the soil is fertile and by far the largest part of the inhabitants are engaged in a primitive type of agriculture, rice and grain of all kinds, as well as beans and tobacco, being grown in the south, and barley, millet, and oats in the north.

Railroads and telegraphs are being introduced by the Japanese. *Fusan* on the south coast, *Chemulpo* on the west, and *Wonsan* on the east are the chief ports. The chief imports are textiles, and supplies and equipments for mines and railway plants. The principal exports are rice, beans and peas, ginseng, and hides.

CHAPTER XXXV

NORTHERN AND SOUTHWESTERN ASIA

ASIATIC RUSSIA

Area, 6,575,000 sq. miles (exclusive of Transcaucasia). Pop., 15,700,000. Density, 2

Asiatic Russia comprises by far the largest part of the Russian Empire, and includes the entire northern part of Asia. More than three fourths of the population is in Russian Turkestan and in the basin of the Ob in western Siberia, while the bulk of the remainder is in the southern part of central and eastern Siberia.

In the north and west the region is mainly a vast low plain. In the east it is traversed by the great highland of Asia, spurs from which render the whole southern border mountainous.

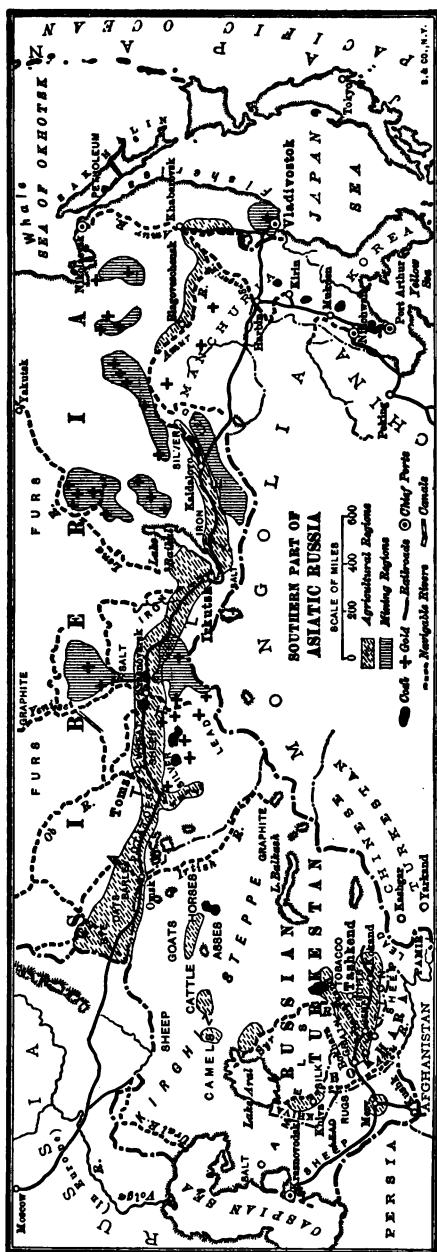
The climate is much like that of Canada, with short warm summers, long cold winters, and rather scanty rainfall. These conditions are intensified in the southwest, where the summers are hotter and so little rain falls that irrigation is necessary for agriculture.

Throughout nearly the whole of southern Siberia, however, between lat. 50° and 60°, the climate and soil are well adapted to farming.

North of the farming section lies the forest region of Siberia, much of which is of little commercial value. The basin of the Yenisei, however, is heavily timbered.

Still further to the north are the tundras.

Industries. — Agriculture and herding are the leading industries, good crops of wheat, rye, barley, oats, potatoes, and vegetables being produced, especially in the Ob basin, while on



the irrigable lands in eastern and southern Turkestan, rice, cotton, grapes, and figs are raised in addition to grain and vegetables. Great herds of sheep, goats, horses, cattle, camels, and asses find pasturage in the dry Kirghiz Steppe and also in the farming regions.

Mineral Wealth. — The mineral wealth of Siberia is exceedingly great. Gold exists in large quantities. Two thirds of the entire output of the Russian Empire in gold comes from Siberia. Graphite, coal, iron, and lead also occur in large quantities.

Transportation Facilities. — The navigable rivers of Siberia afford excellent waterways in summer, but their lower courses are impeded with ice for most of the year. The main commercial highway, however, is the recently constructed trans-Siberian Railroad, which connects *Vladivostok* on the Japan Sea with the railway system of European Russia. This railway opens up for settlement a region vast in natural resources and capable of great agricultural, mineral,

manufacturing, and commercial development. Great numbers of Russian peasants are settling along the line of the railway. Cities are springing up, and new industries are already being rapidly developed.

A trunk line of railway 1000 miles long has also been constructed eastward from *Krasnovodsk*, on the Caspian, to *Tashkend*, through the irrigable region and oases of southern Turkestan, from which region raw cotton and raw silk, as well as animal products, are now exported into Europe.

Khiva and Bokhara are two semi-independent khanates under Russian control, the latter on the western bank of the Amu River, and the former extending up the Amu to and including a part of the plateau of Pamir. The portions of these regions near the Amu are irrigated and, especially in Bokhara, considerable quantities of corn, cotton, silk, fruits, tobacco, and hemp are produced; while in the drier regions great herds of goats, sheep, horses, and camels are raised. Raw silk and cotton and beautiful hand-woven rugs are exported.

AFGHANISTAN AND BALUCHISTAN

These Highland Countries, of which Baluchistan is tributary to British India, are together about half again as large as Texas and lie between India and Persia. They are of little commercial importance, as the surface is mostly a desert, owing to the aridity of the climate.

In some of the mountain valleys, however, where irrigation is possible, are produced two crops a year of rice, millet, maize, the castor-oil bean, indigo, madder, and assafoetida, in sufficient quantities for export. Besides these there is a small export trade in wool, felts, and homemade rugs or carpets. Two railroads from India reach the border of Afghanistan, and one from the Caspian Sea almost reaches Herat. There are no navigable rivers and but few roads. Exports are sent out by caravans and reach India by the Khaibar and Bolan passes, and Persia by Herat to Meshed.

PERSIA

Area, 635,000 square miles. Population, 9,000,000. Density, 14

The Monarchy of Persia lies between the Persian Gulf on the south and the Caspian Sea and Russian possessions on the north. Except narrow coast plains in the north and south, the country lies on the plateau of Iran, and much of it is desert.

Agriculture and Occupations.—In the mountainous southern part and on the Caspian coast plain, irrigation is practicable, and in these regions are raised crops of the poppy, from which opium is obtained, as well as tobacco, silk, cotton, wheat, grapes, and dates in quantities sufficient for export.

Pastoral pursuits give employment to a large part of the population, great numbers of camels, horses, sheep, and cattle being raised,—some of very excellent breeds. Some wool is exported.

The manufactures consist chiefly of fine hand-woven carpets, shawls, and camel's-hair cloth, which find a ready sale in foreign markets. Attar of roses is produced at Shiras. Pearl fishing, on the southern coast, adds considerably to the wealth of the country. Textiles and sugar are the principal imports; and fruits, raw cotton, opium, rice, and wool carpets, the chief exports. Most of the trade is with Russia and Great Britain.

The Transportation Facilities are poor, most of the trade being carried on by caravans. *Teheran*, *Tabriz*, and *Ispahan* are important caravan centers. *Enzeli* (Resht) on the Caspian Sea, and *Bushire* and *Lingeh* on the Persian Gulf, are the chief ports. The three principal routes are :—

(1) The caravan route between Tabriz, the principal trade center in the northwest, and Trebizond, on the Black Sea.

(2) Between Enzeli and Baku by steamers on the Caspian, and from Baku by the Caucasian Railroad to its termination on the Black Sea, and from this point by steamers to different parts of the world.

(3) By sea from the ports of Bushire and Lingeh on the Persian Gulf.

TURKEY IN ASIA, ARABIA, ETC.

Turkey in Asia (area, 680,000 sq. mi.; population, 17,200,000; density, 25) includes Asia Minor, part of Armenia, Syria and Palestine, Mesopotamia, all of the western coast, and about half of the eastern coast of Arabia.



FIG. 170. — Chief Cities, Routes, and Products.

ASIA MINOR or Anatolia is a table-land containing a number of very fertile valleys, although the greater part of it is arid. On the table-land a trade is maintained largely by means of camel

caravans, although 1400 miles of railroads connect *Skutari*, opposite Constantinople, and the interior with *Smyrna*. This city, with a fine harbor on the *Ægean*, and *Trebizond*, with only a roadstead on the Black Sea, are the chief commercial centers and ports of Asia Minor. The chief exports of Asia Minor are raisins, silk, opium, figs, barley, carpets, wool, and sponges.

SYRIA and PALESTINE are generally deficient in rainfall, but the western coast plain and valleys receive enough to make agriculture the chief industry, while the upland of the interior contains large areas of fine grazing country and also areas of desert. *Aleppo*, with its port *Alexandretta*, and *Damascus*, with its roadstead *Beirut*, are the chief commercial centers. The exports are wheat, fruit, wool, and hides; the imports, textiles and ironware.

MESOPOTAMIA is a country whose cultivation depends on irrigation. During the sixth century the rich alluvial soil between the Tigris and the Euphrates under actual cultivation was equal to the entire area of Great Britain. Now, under the misrule of the Porte, the cultivated area is much less. *Bagdad*, on the navigable Tigris, and *Bassora*, to which seagoing vessels ascend, are the chief commercial centers. The exports are wheat, rice, dates, wool, hides, and gum arabic.

YEMEN, a mountainous district on the eastern coast of the Red Sea, has a fair rainfall and raises large crops of coffee, which with hides are shipped from the seaport *Hodeida*.

Arabia is largely a desert table-land. Most of the people live in oases in the interior of the country, where they raise horses and camels. *Jiddah*, on the Red Sea, is the port in the neighborhood of Mecca.

Aden, on the southern point of Arabia, belongs to Great Britain, and is a coaling station for ships on their passage through the Red Sea and Suez Canal. It has a fine harbor, but is situated in so sterile a country that not only all its provisions but even its firewood and water supply are brought to it.

Oman, an independent sultanate on the southeastern coast, has some irrigated valleys that produce fruits, vegetables, and dates, which form the chief articles of export.

times as large as Europe; but it has a smaller extent of coast line in proportion to its area than any other continent, the coast being comparatively unbroken and having few good harbors.

Most of the southeastern part of Africa is a continuous plateau, the highest parts being situated in the mountain chains near the eastern borders. From the western part of this plateau there extend, in a general northwesterly direction, three separate highlands: one, along the western borders of the Red Sea; one, nearly through the center of the continent; and the other in a broken succession of highlands along the coast of the Gulf of Guinea to the Atlantic Ocean on the west. The Atlas Mountains, an independent system, extend on the northwestern coasts of the continent along the shores of the Mediterranean Sea.

South of the Atlas Mountains most of the northern part of the grand division is covered by a great plain, which extends from the Atlantic Ocean nearly to the Red Sea. This is a region of very scanty rainfall and constitutes the Sahara or Great Desert. South of the Sahara there are only narrow plains between the coast and the interior mountain systems or plateaus. In Fig. 171 the green represents lowlands and the brown highlands.

Climate. — The temperature of Africa as a whole is high and equable throughout the year; the difference between the winter and summer months on the northern and southern coasts where it is greatest being about 20° , and on the greater part of the eastern and western coasts only 10° . A temperature of 90° prevails somewhere in the interior throughout the year. This hottest region lies entirely north of the equator in July, but entirely south of it in January, as indicated on the map.

Equatorial Africa has a heavy rainfall and is covered with dense tropical forests. On the north the rainfall is so scanty as to produce the Sahara, one of the most absolute deserts in the world. Even here, however, there are areas that receive occasional rainfall, and in other places the ground water approaches the surface, permitting the growth of vegetation to form *oases* of considerable extent. These serve as halting places for

the caravans which cross the desert. In the south there is also a region of deficient rainfall, occupied by the Kalahari desert and bordered by treeless pasture lands or *veldt*. Throughout tropical Africa the greatest amount of rain falls in the season of greatest heat; that is, in the July half of the year north of the equator, but in the January half of the year south of the equator. On the northern coast and on the extreme southern coast, however, the greatest rainfall is in winter.

Transportation Facilities. — There are a number of great rivers in Africa, but since most of the country is high near the borders, with marginal mountain systems and low plains between them and the coasts, the rivers pour their waters over falls or rapids at no considerable distance from their mouths. In a few cases, however, these obstacles to navigation have been overcome by the construction of railroads, so that navigable portions further inland have been made available. The Nile affords a magnificent waterway over a distance of some 3400 miles. Although there are cataracts on this river, yet, by the construction of railroads around them, communication can be had with the aid of steamers of light draught, almost to the equator.

The Kongo River is navigable for a distance of about 100 miles above its mouth, where a cataract occurs. Here, by the construction of a railroad 250 miles long, another stretch of this great river is reached, navigable for a distance of 2000 miles.

The Zambezi is navigable for some 600 miles from the sea to Victoria Falls. But above these falls the upper river provides a waterway far into the interior of the continent. The Niger, which drains a very extensive region, is navigable for a considerable distance from the sea and is then obstructed by falls, above which it is navigable for a great distance.

In addition to its great river systems, there are a number of large navigable lakes in Africa, mainly in the east. The principal of these are Lakes Nyassa, Tanganyika, Victoria, and Albert.

There are some 13,000 miles of railroads, chiefly in South Africa, Egypt, and Algeria.

CHAPTER XXXVII

NORTHERN AFRICA

MOROCCO

Area, 176,000 square miles. Population, 7,000,000. Density, 40

Morocco, although nearer to Europe than any other country of Africa, is one of the most barbarous and absolute of despotisms. Its ruler is a Mohammedan, who regards all Christian nations with marked aversion.

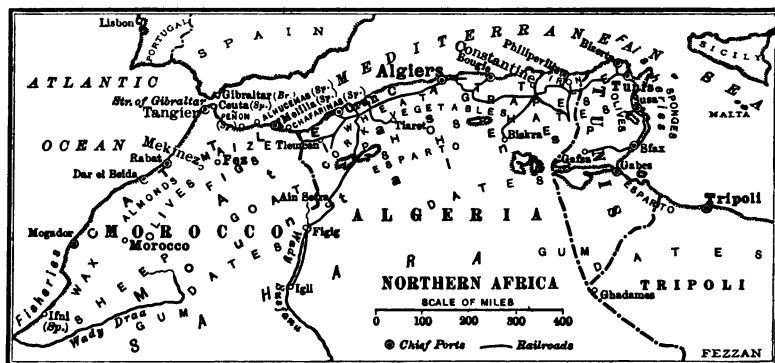


FIG. 172. — Northern Africa — Chief Cities, Railroads, and Products.

The region lying along the shores of the Atlantic and the Mediterranean is extremely fertile and fairly well watered. Cereals, almonds, dates, olives, figs, and other fruits are raised. Farther to the south, however, the rainfall is scanty, and in a large part is desert. In this section it is only in occasional and relatively small oases that agriculture is possible. Herding is a favorite industry. There are rich but unworked mineral deposits in the Atlas Mountains.

There are no railroads, and there is little commerce. The trade that exists is chiefly carried on with Great Britain and France. The exports are wool, corn, goatskins, eggs, and olive oil, and the imports are mainly cotton goods. *Tangier* and *Dar el Beida* are the principal ports. Morocco is the center of the caravan trade across the Sahara. The caravans bring ivory, gold, and ostrich feathers from Timbuktu and the surrounding territory on the south. There is some little trade with the United States, which consists in the exchange of goat-skins for petroleum.

ALGERIA

Area, 343,600 square miles. Population, 4,800,000. Density, 14

Algeria, a dependency of France, includes a large part of the Sahara. The northern part is mountainous and has a good rainfall, which renders the valleys fertile. This is the most important part of the country and contains the bulk of the population, including about 650,000 Europeans and Jews.

The chief occupation is agriculture, — wheat, barley, vegetables, and fruits being the principal crops. Grapes are extensively cultivated, and Algeria is rapidly becoming a great wine-producing country. Large quantities of the native wines are exported to France, where they are mixed with the French wines. An important agricultural product is alfa or esparto grass, employed in the manufacture of paper. The cork tree also furnishes a valuable commercial product. The numerous oases in the southern part of the country produce quantities of dates, which form a valuable export. An extremely important portion of the agricultural products is the early vegetables and fruits that are shipped by fast steamers plying between *Algiers*, the principal city and seaport, and *Marseilles*, this distance being traversed in about twenty-four hours, thus making for France a valuable market of early garden stuff. Ores of iron and zinc are exported, and large quantities of phosphate of lime.

There are about 2000 miles of railroads, chiefly in the coast

region, but extending south of the Atlas Mountains in both the east and the west. French is the official language.

Commerce.—About five sixths of the foreign trade is with France; of the remainder the imports consist chiefly of cattle, copper, timber, and coal; and the exports of ores and phosphates, alfa and other fiber, and cork. These imports come chiefly from Morocco, Great Britain, Brazil, Tunis, and Spain, while the exports go to Great Britain, Belgium, Tunis, Germany, and Italy.

TUNIS

Area, 64,600 square miles. Population, 1,800,000. Density, 28

Tunis lies east of Algeria. Its population, mainly Bedouin and Arab, includes 140,000 Europeans, chiefly Italians and French. Since it has been under the French protectorate, Tunis has made great progress, railroads have been built, and commercial relations with other countries have been entered into.

Agriculture is generally followed. The agricultural products are similar to those of Algeria. The olive oil produced in this country is regarded as the finest in the world. There are some manufactures of carpets and silk goods. Sponge fishing on the coasts of the country affords occupation for many of the inhabitants. As in Algeria, large quantities of wine are produced.

The largest city is *Tunis* near the northeastern coast. By means of a canal recently opened, this city is now directly accessible to large vessels and is increasing in importance. About 500 miles of railway are in operation, connecting the Algerian system with Tunis and extending southward along the east coast to *Sfax*, and thence west to the phosphate mines of *Gafsa*. French is the official language.

Commerce.—The foreign commerce is chiefly with France, Great Britain, Italy, and Algeria. The principal exports are olive oil, cereals, animal products, alfa, ores, and sponges.

TRIPOLI

Tripoli, a dependency of Turkey, lies southeast of Tunis, along the Mediterranean Sea, and extends 500 or 600 miles into the Sahara.

On the northern coast the climate is moist and the soil is fertile. Alfa is raised and exported, though herding is the chief industry.

Murzuk and *Tripoli* are the chief towns, both of these being centers of the caravan trade. Tripoli is the only port of importance in the country. From it are exported many of the goods brought from the Sudan by the caravans. The chief exports are ostrich feathers, ivory, skins and hides, gold, alfa, sponges, and madder. The principal imports are manufactured goods, most of which are carried by the caravans in exchange for the products of the Sudan. These articles consist largely of cheap cottons and hardware from England and Germany, and sugar from France.

Arabic is generally spoken; but Turkish is the official language.

CHAPTER XXXVIII

EGYPT, EGYPTIAN SUDAN, AND ABYSSINIA

EGYPT

Area, 248,000 square miles. Population, 9,700,000. Density, 39

Egypt proper extends south to Wady Halfa in 22° north latitude. It is nominally a dependency of Turkey, but actually under the sovereignty of Great Britain.

The country is almost entirely without rainfall, the fertile, productive, and inhabited part being confined to the delta and the immediate valley of the Nile. This area is only about 13,000 square miles, and hence is very densely populated. It owes its fertility to the overflowing of the river.

The waters of the Nile begin to rise in June and reach their greatest height in October, when the river is usually 40 feet above its average level for the rest of the year. The cause of the overflow is the heavy rainfall in the mountainous districts of Abyssinia, in the region of the head waters of the Atbara and the Blue Nile. The fertility of the country is due not only to the irrigation thus effected, but also to a rich black mud that, during its overflow, is deposited by the river on the land.

The British government has just completed, at a cost of \$16,000,000, a great dam across the Nile at Assouan, with a storage reservoir at Siut, which will greatly increase the irrigable area and insure a water supply at all seasons of the year.

Agriculture. — Only a small fraction of the total area of the country is under cultivation, yet so great is the fertility of the land and so favorable is the climate for vegetation, that three

crops a year are frequently raised: the hardy cereals in winter, cotton, sugar, and rice in summer, and maize in the autumn. Dates are also grown in abundance. The delta region is especially fertile. Cotton, the chief crop, is of long staple which finds a ready market, chiefly in England. Wheat is another important crop.

Transportation Facilities. — The Nile is the great natural highway for the commerce of Egypt. It is navigable to the cataracts in the southern part of Egypt proper and for boats of light draught above the cataracts far into the Sudan. Besides some 1200 miles of railroad paralleling the Nile from Cairo to Khartum, there are 2200 miles in lower Egypt, radiating from *Cairo*, the chief city, to *Alexandria*, the chief port, to *Port Said*, on the Suez Canal, and to various points in the delta.

Commerce. — The foreign commerce of Egypt is greater than that of any other country in Africa except Cape Colony. The exports slightly exceed the imports in value. Cotton is by far the most important export, then come wheat and drugs. The chief imports are textiles, metal goods, and coal. More than half of the exports go to Great Britain, which supplies more than one third the imports. Egypt trades largely also with France, Turkey, Russia, and Germany.

The Suez Canal, through the Isthmus of Suez, extends from Port Said to Suez, a distance of 87 miles. It lies in Egyptian

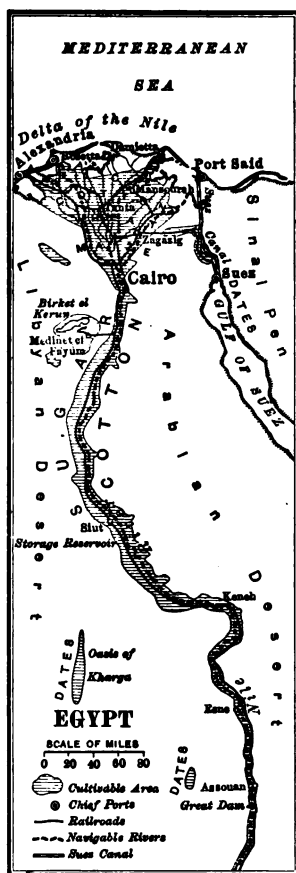


FIG. 173. — Egypt—Chief Cities, Routes, and Products.

territory, although it has little or no commercial relation with Egypt, the canal being used chiefly by vessels plying between Europe and the Far East. About 3700 vessels pass through the canal every year, representing a gross tonnage greater than that engaged in the foreign trade of the port of Liverpool.

THE EGYPTIAN SUDAN

The Egyptian Sudan extends south from 22° north latitude to 5° north latitude and includes the region drained by the White Nile. Like Egypt, it is under the protection of England. There are many fertile areas along the Nile well adapted to wheat and cotton, while farther south are vast forests of ebony, gum acacia, bamboo, and rubber plants. Khartum is the principal town. At present there is but little trade.

ABYSSINIA

Abyssinia, a native kingdom, occupies a portion of a mountainous district difficult of access in the eastern part of Africa. It exports a small quantity of coffee, ivory, civet, employed in perfumery, gold, and skins.

CHAPTER XXXIX

CENTRAL AND SOUTH AFRICA

TROPICAL AFRICA

Now that the slave trade in tropical Africa is practically suppressed, the chief commerce of this great and as yet imperfectly known region consists of various raw materials of the jungle, such as ivory, rubber, gums, tropical nuts, ostrich feathers, copal, etc.

Sudan. — The Sudan, or the Land of the Blacks, includes a large part of the area of Central Africa. Great Britain has the Anglo-Egyptian Sudan, and part of the western coast north of the equator, including the four colonies Gold Coast, Lagos, Gambia, and Sierra Leone, and as a "sphere of influence," Nigeria. France claims the greater part of the territory of the west, including most of the western Sahara, Senegal, Senegambia and Niger territories, French Guinea, Ivory Coast, Dahomey and French Kongo. Germany controls Togoland and Kamerun on the western coast.

Liberia, a negro republic, established by the United States as a home for freed negro slaves, lies on the western coast along the Gulf of Guinea. The soil is exceedingly fertile, but its cultivation is neglected. There are some exports of rubber, ivory, palm oil, cocoa, and coffee. The forests contain valuable cabinet woods, such as mahogany and rosewood, as well as various dyewoods, gums, and medicinal shrubs.

Kongo Free State was established by the various European powers for commercial purposes. The king of Belgium was chosen as its ruler, the trade of the state being free to all nations.

The internal trade is carried on by steamers on the Kongo, which is navigable for a great distance in the interior. A railroad 250 miles in length conveys freight around the unnavigable stretch of river from Stanley Pool (Leopoldville), where it leaves the plateau, to Matadi at the foot of the rapids and about 100 miles from its mouth.

Its foreign commerce has rapidly increased during the past decade. It is carried on mainly with Belgium. The exports are mainly rubber, with some ivory, palm nuts and oil, and copal. The imports are chiefly textiles, food substances, and metal ware.

SOUTH AFRICA

This region, lying mainly south of the Zambezi River, comprises a number of colonies of Great Britain, including Cape Colony, Natal, Orange River Colony, and Transvaal Colony; and Rhodesia, which is practically a colony. Bechuanaland and Basutoland are protectorates belonging to Great Britain. Angola on the western coast belongs to Portugal and the region south of it to Germany. Both of these powers have colonial possessions on the eastern coast of South Africa.

In the greater part of the interior of South Africa the rainfall is deficient. Here agriculture, as a rule, is possible only when aided by irrigation; but the rainfall is greater on the east. The coast regions, except in German Southwest Africa, are well watered.

CAPE COLONY

Cape Colony occupies the most southern part of Africa, and extends northward to Natal, Orange River Colony, Bechuanaland, and German Southwest Africa. The white population of some 400,000 consists of English and Dutch, the former residing in the east and the latter in the west. The climate is generally temperate and, except on the seaward slopes, dry.

The raising of sheep and cattle forms the chief industry in the interior. Agriculture is carried on in the better-watered

districts near the eastern coast. The chief products are wheat, oats, barley, Indian corn, and fruits. Grapes are raised in large quantities and excellent wine is made.

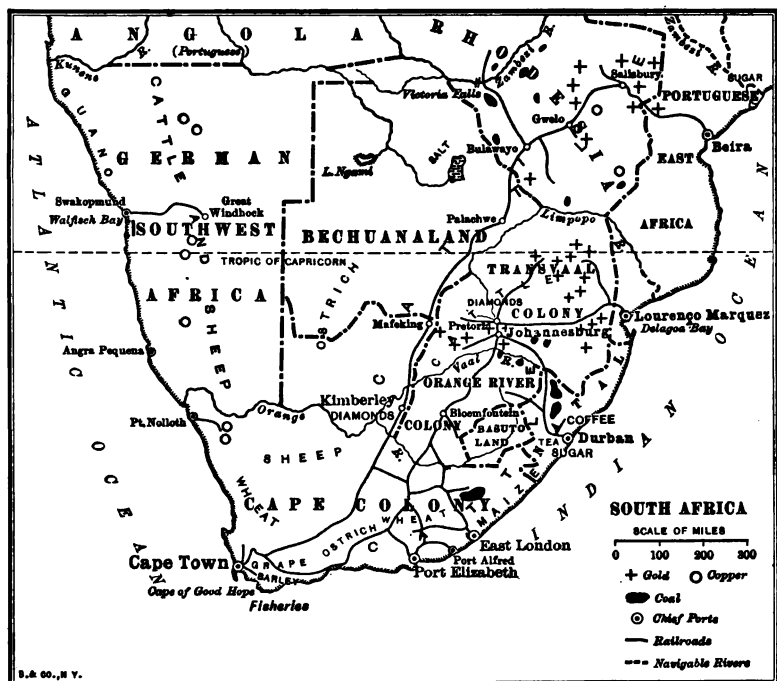


FIG. 174. — South Africa — Chief Cities, Routes, and Products.

The colony has great mineral wealth. The diamond mines of Kimberley, about 600 miles northeast from Cape Town, produce some 98 per cent of the world's supply of these gems. Copper and coal also occur in valuable deposits.

Commerce. — There are about 3500 miles of railroad in the colony, leading in general from the seaports, *Cape Town*, *Port Elizabeth*, and *East London*, inland to the British colonies beyond the Orange River. Normally the exports greatly exceed the imports in value, but during and for some years after the Boer War these conditions were reversed.

The principal exports, in the order of their importance, are gold, diamonds, wool, ostrich feathers, Angora hair, and hides, nearly all of the gold being mined north of Cape Colony and simply transported across it for export. The principal imports are goods required for the mining districts, such as food stuffs and manufactured goods and hardware.

NATAL

Natal, including Zululand, lies northeast of Cape Colony on the eastern coast. It has large and valuable forests, and extensive coal fields. The climate of the coast is almost tropical, but the heat decreases on the slopes of the mountains. The raising of cattle, sheep, and goats is the principal industry in the mountain districts. Agriculture is practiced on the coast. Such tropical products as sugar, tea, and coffee are raised. The most important exports are gold (from the Transvaal), coal, and wool. The principal imports are clothing, iron and steel manufactures, leather, and cotton and woolen goods.

Durban is the chief port and is connected by rail with Pretoria and Johannesburg in the Transvaal, which also use Durban as a shipping point.

ORANGE RIVER COLONY, TRANSVAAL, AND RHODESIA

In these countries cattle raising and mining are the principal industries. The amount of gold mined, particularly in the Transvaal on the Witwatersrand, is very large. Gold, wool, cattle, and hides are exported. Mines of coal and gold have been opened in Rhodesia, and railroads are in process of construction. Pretoria in Transvaal is connected by rail with the port of *Lourenço Marquez*, and Salisbury in northern Rhodesia with the port of Beira, both in Portuguese East Africa.

MADAGASCAR

Madagascar, an island off the eastern coast of Africa, nearly equal in size to Texas, belongs to France. The population

(about 2,500,000) consists mainly of black savages in the west, and of a partly civilized Malay tribe, the Hovas, in the east. The climate in the lower lands is warm and humid, but in the higher central lands it is temperate.

Agriculture and cattle raising are the chief industries. The principal products are rice, manioc, sugar, cotton, cacao, vanilla, sweet potatoes ; and, among minerals, gold, copper, lead, sulphur, and graphite. The exports are cattle, gold, and raffia, and the imports, French cotton textiles. Owing to a preferential tariff, 90 per cent of the imports are from France.

The largest ports are *Tamatave*, *Mojanga*, and *Diégo Suarez*.

MAURITIUS AND RÉUNION

Mauritius and Réunion are small islands in the Indian Ocean, east of Madagascar, the former belonging to Great Britain and the latter to France.

Mauritius produces cane sugar, cereals, cotton, pepper, and indigo. The chief export is sugar, and the imports are cotton goods, provisions, and coal. The trade is mainly with Great Britain and her colonies. *Port Louis* is the only good harbor.

The chief productions of Réunion are sugar, rum, coffee, tapioca, vanilla, and spices. The chief exports are vanilla and tapioca, and the imports, rice and grain. Most of the trade is with France. The only important port is *Pointe des Galets*.

CHAPTER XL

AUSTRALIA, NEW ZEALAND, AND OCEANIA

THE COMMONWEALTH OF AUSTRALIA

Area, 2,973,000 square miles. Population, 4,000,000. Density, $1\frac{1}{4}$

Location and Surface. — The continent of Australia, between the Pacific and the Indian oceans, extends approximately from latitude 10° south to latitude 40° south. The Commonwealth of Australia is a Federal British colony, including the continental subdivisions (states) of Queensland, New South Wales, Victoria, Western Australia, South Australia, and the island state of Tasmania. New South Wales and Victoria have nearly two thirds of the population.

The greater portion of the continent is a low plain, traversed by low ranges of mountains, but rising to a higher mountain range near the eastern coast, some of the peaks of which have a considerable elevation. In Fig. 175 the green represents lowlands and the brown highlands. The coast line is comparatively unbroken, and there are but few good harbors.

Climate. — Since the continent lies in the southern hemisphere, December, January, and February are the summer months, and June, July, and August the winter months. This is of importance in a country whose agricultural products form a considerable part of the exports, since, in such a case, the crops are harvested during the northern winter, when they are apt to command the highest prices.

In summer, the southeast trades bring ample rains to the steep eastern mountain slopes, but comparatively little water falls in the interior of the country, part of which is practically desert.

Large areas, however, are covered with a coarse grass which affords pasturage, and other parts with an almost impenetrable "bush" of thorny acacia. The northern coast receives copious rains during spring and summer, but is dry during the winter months, when northwest winds prevail. The southwestern coast receives a little rainfall from the prevailing winds. The hot and well-watered northern coast has excellent forests, from which fine cabinet woods are obtained. Farther south, on the eastern coast, pine, cedar, and the eucalyptus or gum tree furnish excellent building timber.

Owing to its insufficient rainfall, the streams of Australia are small and few in number, the Murray and the Darling in the southwest being the principal rivers. These rivers receive their waters mainly from the eastern mountain range.

Stock Raising.—The chief occupation is sheep raising, which is especially successful, since the sheep are able to live in the



FIG. 176. — Herd of Sheep, Australia.

open air during the entire year, and require no fodder in winter. The principal product of the continent is wool, which is both

long and fine. Cattle are also raised in great numbers, and beef and mutton, both frozen and canned, form important articles of export.

Mining. — The mineral wealth of Australia and Tasmania is great, the continent being one of the great gold producers in the world. In addition to gold, valuable deposits of silver, copper, tin, coal, antimony, bismuth, zinc, and manganese exist. The gold deposits are especially rich in Victoria, the deposits of coal in New South Wales, and the copper deposits in South Australia and Tasmania. Tin occurs in New South Wales and Queensland. The manufactures, although growing, are unimportant as compared with the other industries.

Agriculture. — Where the rainfall is plentiful, agriculture forms an important industry on the continent. Wheat is raised in quantities sufficient for export. The total crop, most of which is produced in Victoria and New South Wales, is approximately equal to the wheat crop of Ohio. In Queensland some sugar is raised, the large plantations here being operated by Chinese and Japanese laborers, since the hot climate is too severe for the Europeans. Grapes are raised in New South Wales and Western Australia, and made into wine and raisins. Tasmania is noted for its fine apples.

Transportation Facilities. — Up to the middle of the last century, there were very few good wagon roads or railways between the several colonies; but, since the discovery of gold, both roads and railroads have been built, especially in the south and the east, and steamship lines have been established between the continent and both Europe and America.

There are now about 15,000 miles of railroad in the commonwealth, of which about 6500 miles are in the relatively small states of Victoria and New South Wales.

The principal seaports are *Melbourne* in Victoria, and *Sydney* in New South Wales. These lie on the southern and eastern coasts, where there is the densest population. Along the northern part of the eastern coast extends the great coral barrier reef, which, in part, shuts off the coast from the ocean, and in places

affords safe harbors between the reef and the shore. Melbourne is the port from which most of the gold is shipped. It is the largest city on the continent, and has a commodious harbor. *Brisbane* is the port of Queensland and commands the coal and the wool trade of the surrounding country. The chief port on the western coast is *Fremantle*, which is connected by railroad with Perth and a few other cities.

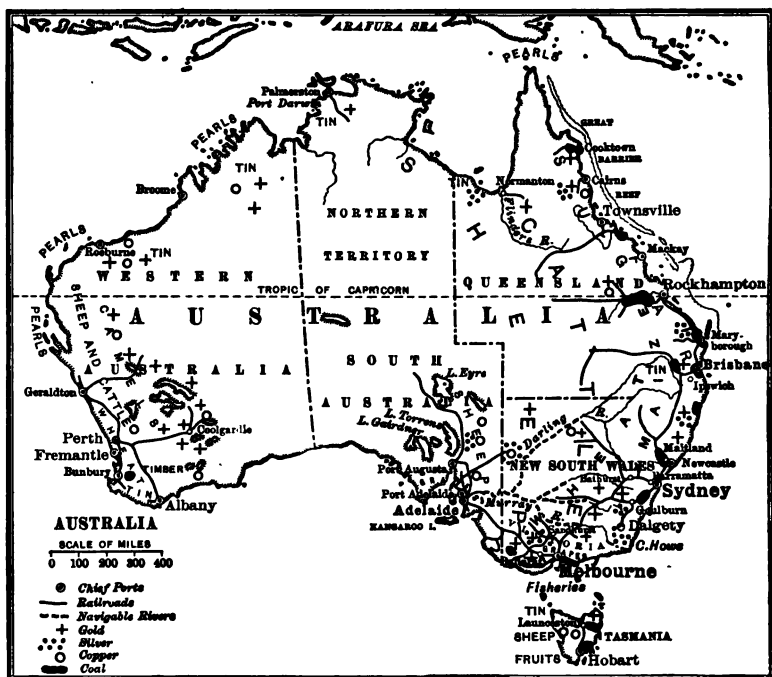


FIG. 177. — Australia — Chief Cities, Routes, and Products.

Commerce. — The foreign trade of Australia, excluding interstate trade, shows a slight excess of exports. About one third of the exports (in value) is wool, another third is gold, and the remaining third is made up chiefly of meat, tallow, hides, skins, leather, wheat, and coal. The principal imports are textiles, machinery, clothing, iron, and sugar.

More than half of the foreign trade is with Great Britain, the rest chiefly with the United States, France, Germany, and Belgium. The English language is used in Australia and in New Zealand.

NEW ZEALAND

Area, 104,600 square miles. Population, 816,000. Density, 8

New Zealand consists chiefly of two mountainous islands, having an area larger than that of Great Britain, of which country it is one of the most prosperous colonies.

Situated in the region of the westerly winds, the western slopes of the islands, especially in the south, receive a heavy rainfall and are clothed with valuable pine forests, while the eastern slopes receive sufficient rain to fit them well for grazing and farming.

Sheep and cattle raising form important industries, animal products constituting about three fourths of the exports. Gold, Kauri gum, and coal occur on the islands. Agriculture is next in importance to grazing. Wheat and oats are the chief crops. Apples and other fruit are extensively raised. Fairly extensive manufacturing interests have been



FIG. 178. — New Zealand — Chief Cities, Routes, and Products.

established on the islands. Iron foundries, furniture manufactories, breweries, and fruit-preserving plants are rapidly increasing.

Commerce. — There are fine harbors on the eastern coast. *Wellington*, the capital, and *Auckland*, the largest city in the

colony, are the principal ports. The exports exceed the imports in value, the principal exports being wool, frozen meats, gold, grain, butter, cheese, and Kauri gum. The imports are clothing, iron, steel, sugar, tea, and spirits. More than half of the foreign commerce is with Great Britain, though there is a large trade with the Australian Commonwealth and a considerable import trade with the United States.

OCEANIA

Oceania is the general name applied to the numerous islands that are situated in the Pacific Ocean. Most of them lie within the tropics.

There is a marked similarity in the vegetation of these islands. On nearly all of them is found the cocoanut palm tree, which is especially valuable since so many different products can be obtained from it. The cocoanut from this tree not only forms the principal food of the people, but its milk furnishes a pleasant drink, and the sap, when fermented, produces a species of wine. The meat of the cocoanut, when dried in the sun, forms an export known as *copra*, the oil of which is employed in large quantities for the production of soap. From the fibers a rough cordage is obtained. The leaves are employed for thatching the rude huts, while the wood is valuable for houses, etc. The sago palm, found on many of the islands, is valuable as producing the nutritious sago. Bananas and some other tropical fruits also form valuable food products.

Possessions of Great Britain in the Pacific. — **NEW GUINEA**, a large island north of Australia and east of the East Indies, has an area of 311,000 square miles and a population of 700,000, consisting chiefly of a negro-like tribe called Papuans. The western half of the island belongs to the Netherlands, the southeastern part to Great Britain, and the northeastern part, or Kaiser Wilhelm's Land, to Germany. The interior is covered by a dense vegetation. The eastern half is very mountainous, and the forests contain valuable timbers, areca, cocoa and sago palms, bamboo, ebony, and gums. Parts of the island are

adapted to the cultivation of cotton, tobacco, rice, and coffee; but the commerce is inconsiderable. The exports are trepang, copra, pearl shell, gold, pearls, and sandalwood; the imports are food stuffs, tobacco, cloth, and hardware. The chief port of British New Guinea is *Port Moresby*, and of Kaiser Wilhelms Land, *Friedrich Wilhelmshafen*.

THE FIJI ISLANDS constitute a British colony. They lie 1700 miles northeast of Australia. Their total area is about 8000 square miles. The population is about 118,000. The principal trade is with Australia and New Zealand. Great quantities of sugar, bananas, and cocoanuts are raised. Sugar and copra form the most important articles of export. *Suva*, the capital, has an excellent harbor, protected by a coral reef.

Possessions of France in the Pacific consist of many small islands, having an aggregate area of 10,000 square miles with a population of 111,000. NEW CALEDONIA, the largest of the Loyalty Islands, lies east of Australia, midway between Papua and New Zealand, the island being somewhat nearer Australia than it is New Zealand. It is the penal colony of France. Its principal exports are nickel, cobalt, and coffee. Its principal commercial relations are with Australia and New Zealand.

SOCIETY ISLANDS include two groups,—the Windward and the Leeward. The principal of the former are Tahiti and Moorea. The islands are mountainous, of volcanic origin, and are surrounded by coral reefs. The principal exports are copra and vanilla. The trade is chiefly with the United States.

THE MARQUESAS ISLANDS are mountainous. The soil is of volcanic origin and very fertile. Cocoanuts, yams, and sugar cane are raised. Tuamotu or Paumotu Islands are numerous small atolls or coral islands in the south Pacific. Gambier and the Tubuai groups also belong to France.

Possessions of Germany in the Pacific include Kaiser Wilhelms Land in New Guinea, the Bismarck Archipelago, Solomon Islands, Marshall Islands, Caroline Islands, Pelew Islands, Ladrone Islands, together with certain of the Samoa Islands. Their total area is 96,160 square miles, with a population of 443,000.

Australia. Six lines of steamers stop there. Considering the area the commerce is large. Nearly all of it is with the United States, of which the islands form a territory.

Besides Hawaii the United States owns the small islands of Guam in the Ladrone group, Tutuila, one of the Samoa Islands, with the fine harbor of *Pago Pago*, Midway Island, a station of the Pacific cable, and Wake Island. None of these small islands possess any present commercial importance; yet, as coaling and cable stations, they may prove of great value to the commerce of the United States.



CHAPTER XLI

SOUTH AMERICA. BRAZIL

SOUTH AMERICA

Area, 6,856,000 square miles. Population, 38,482,000. Density, 5

Location and Surface. — South America is a little more than two thirds as large as North America, and is only about half as densely peopled. It is least sparsely settled along the western and southeastern coasts. Its coast line as a whole is very regular. Only in the extreme southwest is the coast line intricate and fringed with many islands. Elsewhere the principal indentations are the Gulf of Darien and Lake Maracaibo in the north, the estuaries of the Amazon and the Plata in the east, and the Gulf of Guayaquil on the west.

The long, lofty, and relatively narrow Andes Mountain system follows closely the entire west and northwest coast, presenting a continuous wall, or barrier, to transcontinental commerce from two to four miles high. Between 10° and 30° S. lat. this system widens to form the high mountain-bordered plateau of Bolivia, and has an extreme width of 600 miles of highland. Elsewhere the system has a width of highland of less than 200 miles.

In the eastern part of the grand division is the plateau of Brazil, which has an average height of about half a mile. Surmounting it are several low mountain ranges, separated by broad fertile valleys. The plateau of Guiana occupies the northern part of South America, east of the Andes.

Between these three highlands is a vast low plain which occupies the greater part of South America. In Fig. 180 the green represents lowlands and the brown highlands.

Drainage. — This plain is traversed by three great river systems: (1) that of the Amazon, which rises in the Andes, and flows east-

ward near the equator; (2) that of the Plata-Parana-Paraguay, which flows southward between the Andes and the Brazilian Plateau; (3) that of the Orinoco, which flows northeastward between the northern Andes and the Guiana Plateau. The tributaries of these systems interlock in obscure divides in the lowland east of the Andes.

The only considerable rivers of South America not belonging to these systems are the Magdalena between ranges of the Andes in the north, the São Francisco in the east, and the Colorado and Rio Negro in the far south.

Climate.—The greater part of South America lies in the torrid zone and has a high temperature, the monthly average of which does not vary much more than 10° throughout the year. The southern part lies in the temperate zone and has warm summers and temperate winters; but even in the vicinity of the Plata the difference between the average temperature of the warmest and coldest month is less than 30° F. It is only in the extreme south and on the high Andes that cold weather occurs.

The moist northeast and southeast trade winds deposit a copious rainfall on the eastern slopes of the Brazilian and Guiana highlands and of the much higher Andes; while the belt of equatorial calms (where the trade winds meet, ascend, and deposit rain) sweeps north and south over the Amazon valley each year, causing two rainy seasons annually in the central portion of the valley, but only one rainy season (December to February) near its southern margin, and one (June to August) in the Orinoco valley to the north.

The western slope of the Andes in the trade-wind region is a desert with scarcely a drop of rain; but in the region of prevailing westerly winds south of the tropic, the western slope receives a copious rainfall, while the country to the east is relatively dry and arid.

Resources and Productions.—The warm climate and abundant rainfall of equatorial South America east of the Andes has led to the growth of a dense tropical forest—the silvas or woods—over vast areas of the Amazon valley and high up the east slopes

of the intertropical Andes. These forests furnish rubber, cinchona, gums, cabinet woods, and other forest products. Extensive forests of fine lumber also clothe the well-watered western slope of the southern Andes, and the eastern slopes of the Brazilian and Guiana plateaus.

On the plains or *llanos* of the Orinoco valley, on considerable areas (*campos*) of the interior portion of the Brazilian plateau, and on the plains or *pampas* southwest and west of the Plata the rainfall is too slight or too intermittent to support forest growth; but natural grasses flourish, and with the equable climate adapt these regions perfectly to the raising of horses and cattle, and the pampas to sheep; and in all these regions, but especially in the pampas, herding is a characteristic occupation.

Agriculture is as yet confined to a comparatively narrow zone about the northern, eastern, and, to a much less extent, the western coasts; but in this region the greatest part of the world's supply of coffee is produced on the uplands, while in the lowlands sugar, tobacco, cotton, and fruit are produced in the warmer, and wheat and other cereals in the cooler latitudes.

South America is extremely rich in various mineral products. These are found in all of its mountain systems, but especially in the Andes, in which rich deposits of gold, silver, copper, tin, iron, lead, bismuth, and antimony exist.

All the countries of South America, except the Guianas, are, at least in name, independent republics, and in all these republics the Spanish language is spoken, except in Brazil, where Portuguese is spoken.

BRAZIL

Area, 3,300,000 square miles. Population, 14,334,000. Density, 4½

Brazil comprises nearly half of South America, and is about as large as the United States. The interior is very sparsely peopled. Nearly all the whites live near the southeastern coast.

The Brazilian plateau is bordered on the southeast and broken in the east by mountain ranges, but merges gradually into the



FIG. 182. — Drying Coffee, Brazil.

southern part of Brazil that cattle raising has as yet become an industry.

Agriculture is developed chiefly in a relatively narrow strip of territory along the south-eastern coast. Sugar cane, cotton, and tobacco are raised on the lower lands, while on the uplands is produced coffee — by far the most valuable crop, for Brazil is the largest coffee producer in the world.

The minerals discovered are coal, lignite, iron, gold, manganese, and diamonds of fine quality. Brazil is probably one of the richest countries in the world in



FIG. 183. — Brazil — Chief Agricultural Products.

minerals. Comparatively little has, however, been done to develop these resources.

Manufacturing is as yet of but little importance. In Rio de Janeiro there are some cotton, woollen, and flour mills. A little iron is smelted in the country. Leather is produced in the south.

Transportation Facilities.—There are over 10,000 miles of railroad in operation and about 4000 miles in process of construction. Most of these are in the southern part of the country, as indicated on the map.

In the north the Amazon, navigable to the base of the Andes in Peru, and its great tributaries afford about 27,000 miles of navigable water within Brazil and form practically the only highways through the dense forests.

Steamship lines have been established between Europe and the Amazon, Bahia, and Rio de Janeiro.

Rio de Janeiro, the capital and principal commercial center, is situated on a fine harbor. *Santos*, southwest of Rio de Janeiro, is the port of *Sao Paulo*, the center of a rich coffee region. *Bahia* and *Pernambuco*, on the east central coast, are the principal export ports for tobacco and sugar. *Para*, near the mouth of the Amazon, is of importance as a shipping point for the rubber trade. *Maranhão* is the principal port for the cotton trade. *Porto Alegre*, near the extreme southern coast, is one of the ports of the pampas region and exports hides.

Commerce.—About 60 per cent of the foreign trade of Brazil consists of exports, of which coffee constitutes more than half, and rubber about one fourth. Hides, cotton, cacao, tobacco, sugar, and maté are exports of less value. Nearly half of the export trade is to the United States, and the bulk of the remainder to Great Britain, Germany, and France. The imports include wheat, flour, textiles, machinery and iron goods, meat, coal, and petroleum. About one fourth of the imports are from Great Britain, about the same proportion from United States and Germany together, while smaller amounts are from Argentina, France, and Portugal.

CHAPTER XLII

THE PLATA COUNTRIES

PARAGUAY

Area, 97,700 square miles. Population, 636,000. Density, $6\frac{1}{2}$

Paraguay lies between Brazil, Argentina, and Bolivia. Although without sea coast, yet the Plata river system furnishes it communication with the sea and other countries.

The eastern part of the country is crossed by low mountains, covered with valuable forests, which supply timber, rubber, gums, and dyewoods.

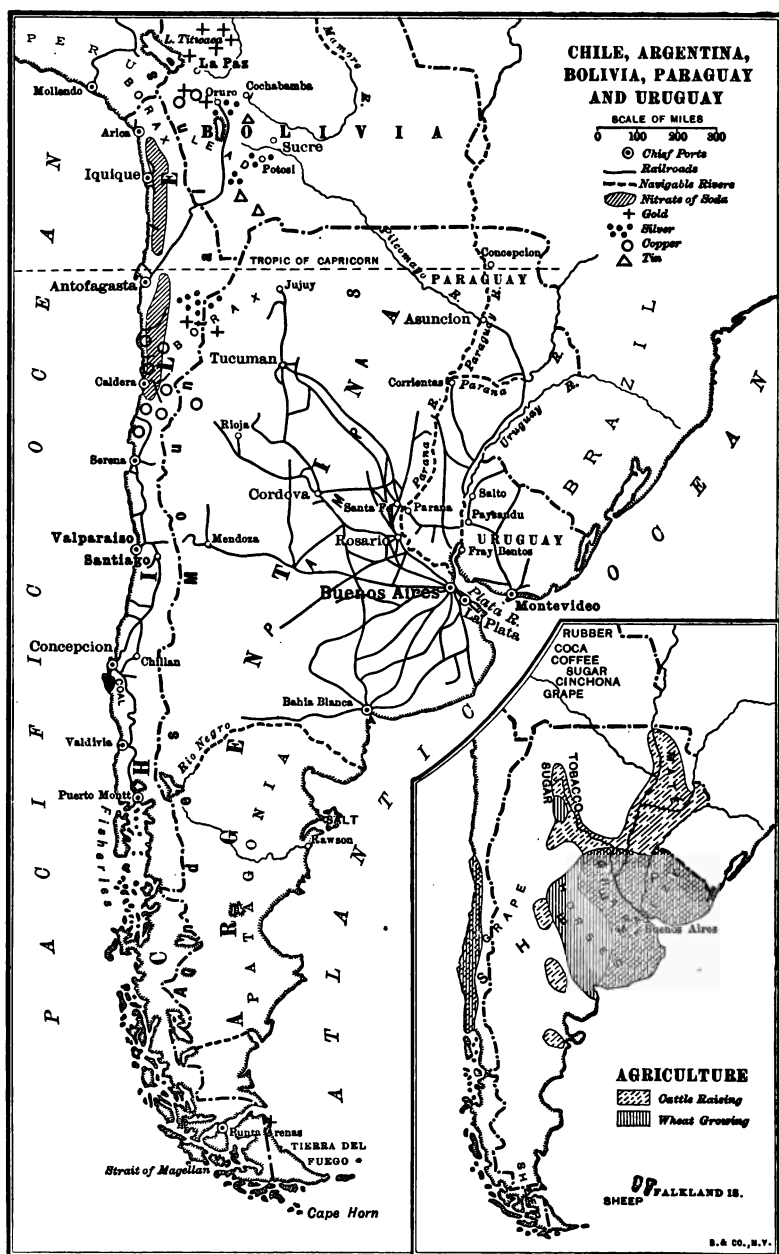
The climate is generally hot and rather dry, with most of the rainfall between September and April. A little agriculture is practiced. The principal agricultural crops are maté, or Paraguay tea, which is exported to other South American countries, and the manioc, from which tapioca is obtained. Maize, sugar, and coffee are also grown, but mainly for home consumption. The tobacco crops, however, are larger, and find a good market in Argentina.

The climate is too warm for sheep raising, but many cattle are raised. Manufactures are not well developed, although, in the neighborhood of Asuncion, the capital, there are some breweries and tanneries, match and soap factories, and flour mills. The foreign trade is small (\$6,000,000), the exports consisting of maté or Paraguay tea, tobacco, hides, and the products of the forest.

URUGUAY

Area, 69,000 square miles. Population, 978,000. Density, 14

Uruguay is situated between Brazil and Argentina, on the north bank of the Plata estuary. Near the Atlantic coast its



surface is a level plain, which affords rich pasturage. The climate is mild and the rainfall sufficient for agriculture. Wheat, corn, tobacco, grapes, olives, and flaxseed are raised chiefly for home consumption. The principal industry is the raising of cattle and sheep; and hides, wool, jerked beef, extract of beef, and tallow constitute nine tenths of the exports. About half of the exports go to France, Brazil, Argentina, and Belgium in nearly equal proportions. Germany, Great Britain, and the United States take smaller amounts. About half of the imports are from Great Britain, Germany, and Argentina.

Montevideo, the chief port, is a city of considerable size and is rapidly increasing in population. It is connected with the principal interior towns by about 1200 miles of railroad, and with Europe and the United States by steamship lines. *Fray Bentos* and *Paysandu* are ports on Uruguay River and the great centers for the preparation of meats for transportation.

ARGENTINA

Area, 1,100,000 square miles. Population, 5,000,000. Density, 5

Argentina is the leading and most progressive of South American republics, although its resources are as yet but slightly developed. It occupies the southern part of South America east of the Andes.

Practically all the country is a great plain that increases gradually in altitude from the coast toward the foot of the Andes Mountains. The prevailing westerly winds leave most of their moisture on the western side of the Andes; consequently Argentina as a whole is scantily watered, and in the northwest and the south is distinctly arid; but in the lower valleys of the Parana and Paraguay there is more rainfall, and much wheat, corn, linseed, cotton, sugar cane, and tobacco are raised, irrigation being used in certain sections. On the plains or pampas, millions of sheep, cattle, and horses find ample pasturage. Excepting Australia, Argentina has more sheep than any other country in the world, and only the United States and Russia

have more cattle. The mineral resources of the republic are as yet little developed, although coal, gold, silver, and copper exist in the Andean regions.

Manufactures are now fairly extensive, and cotton and woolen mills have been established. Structural iron, leather goods, paper, raw sugar, and beer are also made.

Transportation Facilities and Commerce.—The river system of the Plata forms a magnificent waterway that extends through the eastern part of the country. The smooth surface of the pampas permits railroad construction at relatively low cost, and 11,500 miles have been built. These bring the various centers of production in communication with the ports of *Buenos Aires* and *Rosario*. The Trans-Andean Railway from Buenos Aires to Valparaiso, Chile, is completed, except a short Andean section, and will reduce to three days the long and dangerous journey around Cape Horn or through the Strait of Magellan. Buenos Aires (pop. 965,000) is not only the chief port, but the commercial center, being to Argentina what New York is to the United States. It is connected by steamship lines with Europe and the United States. A new port is being constructed at *La Plata*, as the required depth of channel at Buenos Aires is maintained only by constant dredging. Cordova is the most important railroad and commercial center in the interior.

Argentina has a foreign commerce in which the exports exceed the imports in the ratio of 60 to 40. More than half of the exports consist of animal products, Argentina exporting more wool than any other country except Australia, besides much beef and mutton, tallow and butter, and many hides. Corn, wheat, linseed, and some sugar are also exported. About one half of the exports go to Great Britain, France, and Germany, and about one third of the remainder to Belgium and the United States.

The principal imports are textiles and apparel, machinery and hardware, pottery and glassware, and certain food substances. A third of the imports come from Great Britain, about a third from Germany and the United States, and a large part of the remainder from Italy.

CHAPTER XLIII

THE ANDEAN COUNTRIES

CHILE

Area, 293,000 square miles. Population, 3,175,000. Density, 11

Chile is the most important republic on the Pacific coast of South America, and rivals Argentina in progressiveness. It occupies the southern half of the narrow western slope of South America. Between the Andes and a low range of mountains along the coast is a relatively broad central valley in which most of the activities of the country are centered.

From its great extent of latitude, Chile possesses a wide range in both temperature and rainfall. Its northern part lies in the hot torrid zone within the limits of the southeastern trade winds. It has scarcely any rainfall, and is consequently desert. In the middle latitudes the climate is temperate and the rainfall ample for agriculture. In the southern part westerly winds prevail, the rainfall is heavy, and the forest growth is extensive.

Industries and Products. — The occupation of the people is chiefly mining in the northern part, agriculture in the central part, and industries connected with the forest products and fisheries in the southern part.

The chief wealth of the republic lies in its desert lands, where, on account of the absence of rain, immense deposits of nitrate of soda have accumulated in the soil. This material forms an excellent fertilizer. The extent of these deposits is such that, although mined in large quantities for many years, they appear to be far from exhausted. Copper is found in large quantities, and coal, gold, and silver are mined.

Wheat and most of the cereals are raised in the central part of the country, together with tobacco and the fruits of the temperate zone, including excellent grapes. Santiago, the capital, is the garden spot of the republic, being situated on a plain that has been rendered fertile by means of irrigating canals. The raising of cattle and sheep receives much attention.

The manufactures have been considerably developed of late years. They include flour and sugar, leather, machinery, and locomotives. Most of the factories are near Valparaiso.

Transportation and Commerce.—Although a mountainous country, yet there are numerous highways extending along the fertile valleys, besides 2800 miles of railroad. Several lines of steamers ply between the ports of this country and other parts of the world.

Valparaiso, the principal port of Chile, is the most important port on the Pacific coast of South America. *Iquique* is also an important port, from which are shipped most of the nitrates. *Antofagasta* does a large shipping trade, being the terminus of a railroad connecting Bolivia with the coast.

The exports constitute about 55 per cent of the foreign commerce. Nitrates make up about two thirds of the exports, and copper and other minerals much of the remainder. Some leather, hides, wool, and wheat are also exported. The bulk of the exports go to Great Britain and Germany, and most of the remainder to the United States and France. Imports are textiles, machinery, sugar, coal, and oil, chiefly from Great Britain, Germany, and the United States.

BOLIVIA

Area, 443,000 square miles. Population, 1,766,000. Density, 4

Bolivia is an interior state lying north of Paraguay and Argentina, between Brazil, Chile, and Peru. The population is mostly Indian or of Indian descent, though the Spanish language is used. Most of the country lies on the elevated Bolivian plateau, but the eastern part includes a portion of the densely forested plains in the Amazon and the Plata basins.

The country of the eastern slope has a copious rainfall, and, on account of its elevation, enjoys a temperate climate.

The mountainous regions contain great stores of mineral wealth, especially of silver, tin, lead, copper, and gold. Here are the famous silver mines of Potosi. The mineral products, however, are lessened in value by the absence of coal for smelting and by the cost of transporting the ores and metals to the coast for export.

The agricultural region, east of the highlands, produces coca, cinchona, coffee, sugar, and rubber. Recently the rich rubber region of Acre in the north was ceded to Brazil.

The commerce is necessarily limited on account of the poor transportation facilities. A railroad has been built from Molendo, Peru, to Puno at the north end of Lake Titicaca, whence steamers traverse the lake to *Chililaya*, the Bolivian port near the south and only 50 miles from La Paz. The silver and tin mines around Oruro are connected by rail with the Chilean port of Antofagasta. The products of the agricultural region are carried down the affluents of the Amazon and the Plata.

The little foreign commerce that exists is with Great Britain, Germany, and France. The chief exports are silver, tin, coffee, rubber, wool, hides, and cacao. The leading imports are textiles and hardware.

PERU

Area, 439,000 square miles. Population, 4,586,000. Density, 10

Peru lies northwest of Chile and Bolivia, and extends from the hot, rainless desert of the Pacific coast across the chilly highland of the Andes into the humid, forest-covered lowland of the Amazon valley. The population is largely Indian or of Indian and Spanish descent.

The valleys of mountain streams along the coast, when irrigated, furnish crops of cotton, sugar, and rice. Long fiber cotton is grown in northern Peru. The eastern slope of Peru is the home of the cinchona tree, from which quinine is obtained. Here is also grown cacao, tobacco, coffee, and coca, a shrub cultivated

on the lower mountain slopes, whose leaves furnish the valuable drug, cocaine. Rubber is obtained from the forests in the valley

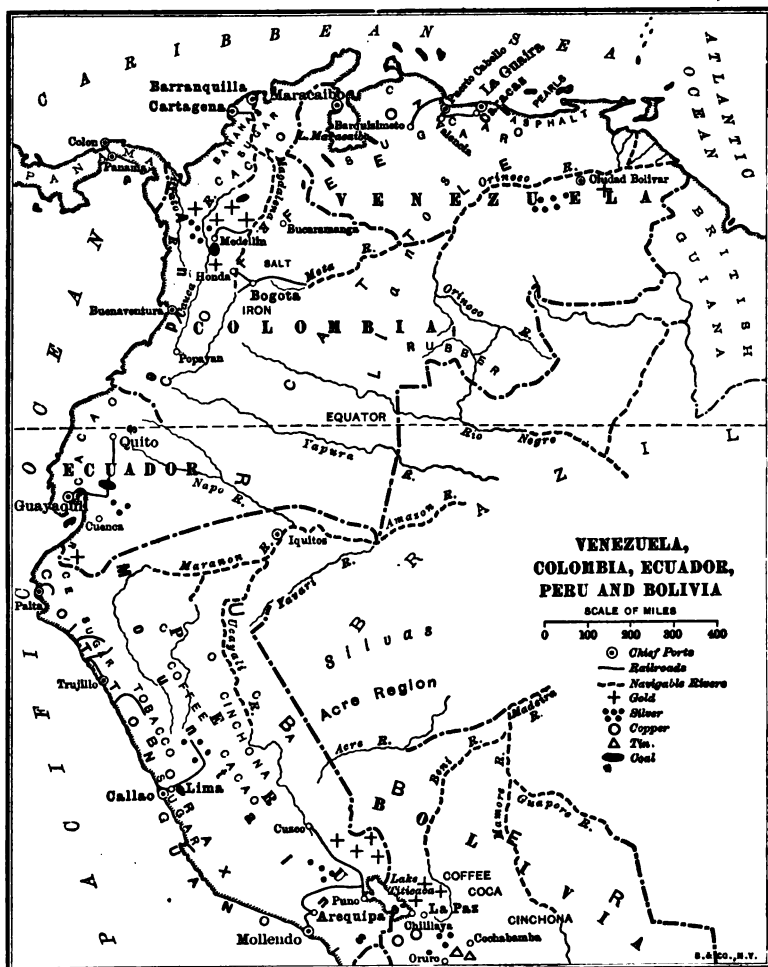


FIG. 185. — Chief Cities, Routes, and Products.

of the Amazon. On the plateau, cattle are raised both for the flesh and the hides, and the llama and alpaca both as beasts of burden and for their wool. Deposits of gold, silver, and coal

occur in various parts of the country. There are some cotton and woolen mills. The famous Panama straw hats, so called because they are shipped from Panama, are made by the Indians.

Transportation Facilities and Commerce. — There are about 1200 miles of railroads in the republic, extending from various Pacific ports to the great plateau region. *Callao*, the chief port, is connected by railroad with Lima, the largest city. Both these places have small manufactories. *Iquitos*, in the northeastern part of the republic, has communication with Europe by means of the Amazon and the Atlantic Ocean. It is the point of shipment for rubber.

About half the foreign trade is with Great Britain, and most of the remainder with the United States and Germany. The chief exports are silver and copper ores, sugar, guano, cotton, coffee, wool, hides, and coca. The chief imports are textiles, hardware, and machinery from Great Britain and Germany, wheat kerosene, and manufactured foods from the United States.

ECUADOR

Area, 118,600 square miles. Population, 1,300,000. Density, 10

Ecuador lies north of Peru, and like it extends from the Pacific across the Andes into the Amazon valley, hence there is almost every variety of climate: the torrid in the lowlands, the temperate on the plateaus where wheat, barley, and potatoes may be raised, and cold on the higher mountains.

The principal commercial product of the country is cacao. The raising of animals also constitutes an important industry. Although there are valuable mineral deposits in the country, little attention has been given to mining. There are some manufactures at *Guayaquil*, which has a fine harbor and is the commercial center of the country.

Commerce. — The foreign commerce is limited and is carried on chiefly with France, Great Britain, the United States, and Germany. Cacao is by far the most important export, though ivory nuts, coffee, rubber, and Panama hats are also exported.

CHAPTER XLIV

THE NORTHERN COAST COUNTRIES

COLOMBIA

Area, 466,000 square miles. Population, 3,917,000. Density, 8

Colombia lies north of Ecuador and occupies the northwest angle of South America.

The northern part is a rather broad coastal plain intersected inland by the spurs of the Andes, which traverse the west central portion of the country in three separate ranges, with broad longitudinal valleys between. It is this region that contains the present industries of the country, for the low plateau east of the Andes is a practical wilderness, merging eastward into the silvas in the southeast and into the llanos in the northeast.

The lowlands are subject to a torrid heat. Rubber trees, cacao, sugar, and bananas are cultivated. The elevated regions of the Andes have a more temperate climate, and coffee, wheat, and tobacco are raised. Cattle are herded in various localities. The country possesses considerable mineral wealth in gold, silver, and precious stones. Coal and iron are mined in the regions about Bogota, where there are some iron works, and small quantities of soap, matches, tobacco, and leather are manufactured.

The only easy connection between the coast and the interior is by the three rivers, — the Atrato, the Magdalena, and the Cauca. The Magdalena is navigable for 800 miles with a single break at the rapids of Honda, but a bar at the mouth makes it necessary to transship goods. There are only about 400 miles of railroad.

The foreign commerce is chiefly with the United States, Great Britain, Germany, and France. The principal exports are coffee, gold, cacao, hides, and Panama hats, from this and from adjacent

republics. *Barranquilla*, at the mouth of the Magdalena River, has the principal foreign trade. *Cartagena*, on the coast, a short distance to the southwest of Barranquilla, is also an important port.

VENEZUELA

Area, 364,000 square miles. Population, 2,445,000. Density, 7

Venezuela lies east of Colombia, on the northern coast of South America.

The northern and eastern parts of the republic are mountainous. The remainder of the country, occupied by the valley of the Orinoco River and its tributaries, is a comparatively level district known as the llanos. Between the northwestern mountains and the coast is the agricultural region, where large crops of coffee, cacao, and sugar cane are raised. The climate, though hot, is tempered by the trade winds from off the sea.

There are valuable deposits of gold, silver, and copper in the mountains, and several asphalt lakes near the northern coast. There is some pearl fishing on the northern coast. Besides the raising of cattle, the principal industry is agriculture. The most valuable crops are coffee and cacao, nearly all of which are exported. Transportation facilities are few, and therefore commerce is limited. There are about 500 miles of railroad.

The foreign commerce is chiefly with France, United States, and Germany. The exports consist largely of coffee, cacao, hides, and gold. The imports are mainly cotton goods, iron, machinery, and provisions. Coffee is exported chiefly from *Maracaibo*, and cocoa from *La Guaira*.

THE GUIANAS

Area, 175,000 square miles. Population, 415,000. Density, 2½

Guiana lies on the northern coast, east of Venezuela, and comprises the only foreign possessions in South America — British, Dutch, and French Guiana respectively.

Commercially these foreign colonies are of little value. The climate is hot, damp, and unhealthful, hence few Europeans are attracted to this part of the world.

The raising of sugar cane is the most important industry, but has considerably decreased since the development of the beet sugar in Europe. The raising of coffee, rice, and cacao are now to some extent taking the place of the cultivation of sugar. There are profitable mines of gold in each colony.

The most flourishing of these colonies is British Guiana, from which gold and sugar are exported. The principal imports from Great Britain are manufactured articles and from the United States, kerosene, fish, and breadstuffs. Cacao is exported from Dutch Guiana. French Guiana is a penal colony of France.

FALKLAND ISLANDS

Area, 6600 square miles. Population, 2000

The Falkland Islands constitute a British colony, and are of importance mainly as a station for refitting and furnishing ships for the stormy passage around Cape Horn.

Sheep raising is the principal industry.

South Georgia is a dependency of the Falkland Islands. The island is generally icebound and inhospitable.

TABLE I—AREAS AND POPULATION

COUNTRY	AREA IN SQUARE MILES	POPULATION	DENSITY OF POPULATION TO A SQUARE MILE
Abyssinia	318,000	8,330,000	27
Afghanistan	241,000	4,550,000	19
Alaska	591,000	64,000	*
Algeria	343,600	4,800,000	14
Arabia	880,000	950,000	1
Argentina	1,100,000	5,000,000	5
Australia (Commonwealth)	2,973,000	4,000,000	1½
Austria-Hungary	261,300	47,150,000	180
Baluchistan	141,000	742,000	5
Belgium	11,400	6,700,000	587
Bolivia	443,000	1,766,000	4
Brazil	3,300,000	14,334,000	4½
British Borneo	88,000	800,000	9
British South Africa	1,197,000	7,000,000	6
British West Indies	12,000	1,650,000	137
Bulgaria	37,300	3,750,000	100
Canada	3,756,000	5,375,000	1½
Central America	206,000	4,136,000	20
Ceylon	25,000	3,600,000	144
Chile	293,000	3,175,000	11
China proper	1,500,000	407,300,000	272
Colombia	466,000	3,917,000	8
Cuba	44,000	1,570,000	36
Denmark	14,850	2,450,000	165
Dutch East Indies	585,000	35,000,000	60
Ecuador	118,600	1,300,000	10
Egypt proper	248,000	9,700,000	39
France	207,000	39,000,000	188
French Indo-China	256,000	15,600,000	61
Germany	210,000	56,400,000	269
Great Britain and Ireland	121,000	42,000,000	347
Greece	25,000	2,435,000	97
Greenland	838,000	12,000	*
Guianas	175,000	415,000	2½
Haiti	11,000	1,294,000	118
Hawaiian Islands	6,450	154,000	24
Iceland	40,000	80,000	2
India, British	1,790,000	298,000,000	167
Italy	110,700	32,500,000	294
Japan	161,150	46,500,000	289
Korea	84,250	9,670,000	115
Mexico	767,000	13,600,000	18
Morocco	176,000	7,000,000	40
Netherlands	12,500	5,100,000	407
Newfoundland	42,700	217,000	5
New Guinea	311,000	700,000	2½
New Zealand	104,600	816,000	8
Norway	124,000	2,220,000	18
Paraguay	97,700	636,000	6½
Persia	635,000	9,000,000	14
Peru	439,000	4,586,000	10
Philippine Islands	115,000	7,636,000	66
Porto Rico	3,600	953,000	265
Portugal	35,700	5,400,000	151
Roumania	50,700	5,000,000	116
Russia in Asia	6,672,000	21,200,000	3
Russia in Europe	2,113,000	109,700,000	52
Santo Domingo	18,700	416,000	22
Servia	18,600	2,500,000	134
Siam	244,800	6,320,000	26
Spain	195,000	18,500,000	95
Straits Settlements	35,500	1,454,000	41
Sweden	173,000	5,100,000	30
Switzerland	16,000	3,325,000	208
Tripoli	405,800	1,000,000	2½
Tunis	64,600	1,800,000	28
Turkey in Asia	680,000	17,200,000	25
Turkey in Europe	64,600	5,900,000	91
United States	3,691,000	76,000,000	25
Uruguay	69,000	978,000	14
Venezuela	364,000	2,445,000	7

* = less than 1 to a square mile.

TABLE II—FOREIGN COMMERCE AND RAILROAD MILEAGE

	IMPORTS — THOUSANDS OF DOLLARS	EXPORTS — THOUSANDS OF DOLLARS	TOTAL FOREIGN COMMERCE — THOUSANDS OF DOLLARS	MILES R.R.	Mi. R.R. PER 100 SQ. MI. AREA
Algeria	\$64,228	\$60,804	\$125,032	1,920	*
Argentina	99,433	173,205	272,638	11,460	1
Australia	203,644	213,713	417,357	14,789	*
Austria-Hungary	349,228	388,460	737,688	24,096	9
Belgium	459,472	371,620	831,092	2,843	25
Bolivia	5,587	11,076	16,663	700	*
Brazil	113,288	177,323	290,611	10,408	*
British Colonies not named	53,391	23,102	76,493	2,394	*
British South Africa	243,148	102,911	346,059	7,139	*
British West Indies	32,471	29,196	61,667	302	3
Bulgaria	13,751	20,011	33,762	1,020	*
Canada	224,814	196,161	420,975	19,078	3
Chile	48,336	67,846	116,182	2,800	*
Chinese Empire	198,364	134,720	333,084	2,870	1
Colombia	8,190	17,341	25,531	411	*
Costa Rica	4,415	5,661	10,076	349	2
Cuba	58,826	77,849	136,675	1,479	3
Denmark	116,726	85,730	202,456	1,912	13
Dutch East Indies	86,894	98,724	185,618	1,392	*
Ecuador	7,023	8,811	15,840	125	*
Egypt	73,222	87,081	160,310	3,400	1
France	848,026	820,671	1,668,697	27,870	13
French Colonies not named	46,868	35,806	82,674	1,216	*
French East Indies	41,964	40,677	82,641	900	*
German Colonies	8,969	4,497	13,466	320	*
German Empire	1,340,178	1,113,313	2,453,491	34,314	16
Great Britain and Ireland	2,571,416	1,379,283	3,950,699	22,435	19
Greece	26,034	15,466	41,500	700	3
Guatemala	3,018	7,134	10,152	400	1
Haiti	5,500	12,760	18,260	43	*
Honduras	1,672	2,357	4,029	57	*
India, British	255,614	408,396	664,010	26,956	1
Italy	342,718	284,177	626,895	9,960	9
Japan, including Formosa	140,352	134,207	274,559	4,651	3
Korea	6,744	4,142	10,886	326	*
Mexico	74,690	88,200	162,890	12,070	1
Netherlands	867,308	732,975	1,600,283	1,809	14
New Zealand	55,121	66,403	121,524	2,252	2
Nicaragua	2,185	3,243	5,428	210	*
Norway	77,779	45,687	123,466	1,480	1
Panama	2,505	1,146	3,651	47	*
Paraguay	2,270	3,787	6,057	156	*
Persia	23,703	13,243	36,946	6	*
Peru	21,062	17,938	39,000	1,146	*
Philippine Islands	32,972	33,122	66,094	120	*
Portugal	60,044	30,710	90,754	1,486	4
Roumania	54,686	72,340	127,026	2,000	4
Russia (and Finland)	350,805	431,332	782,137	38,466	2
Salvador	2,624	3,926	6,550	100	1
Santo Domingo	2,987	5,224	8,211	130	*
Servia	8,650	13,920	22,570	369	2
Siam	15,782	21,103	36,885	325	*
Spain	175,487	161,297	336,784	8,520	4
Straits Settlements	146,360	125,535	271,895	365	1
Sweden	134,605	105,154	239,759	7,631	4
Switzerland	217,803	168,741	386,544	2,816	18
Tunis	12,483	7,551	20,034	430	*
Turkey	117,134	59,072	176,206	3,089	*
United States	1,025,719	1,392,231	2,417,950	207,784	7
Uruguay	24,565	33,656	58,221	1,210	2
Venezuela	8,560	14,900	23,460	529	*
TOTAL	\$11,621,366	\$10,266,667	\$21,888,033	535,845	

* = less than 1 mile railroad to 100 square miles of area.

TABLE III—UNITED STATES—ANNUAL PRODUCTION

		QUANTITY	VALUE
VEGETABLE	Wheat (average)	625,000,000 bu.	\$395,000,000
	Corn (average)	2 094,000,000 bu.	854,000,000
	Oats (average)	823,000,000 bu.	254,000,000
	Hay (average)	59,000,000 S.T. ²	467,000,000
	Sugar, cane ¹ (average)	248,000 L.T. ³	25,000,000
	Sugar, beet ¹ (average)	143,000 L.T.	15,000,000
	Rice	250,000,000 lb.	6,000,000
	Tobacco	816,000,000 lb.	55,000,000
	Cotton (average)	10,000,000 bales	406,000,000
	Flaxseed (average)	25,000,000 bu.	20,000,000
	Irish Potatoes (average)	232,000,000 bu.	122,000,000
	Lumber—Annual Cut	25,280,000 M. Ft. B.M. ⁴	174,000,000
ANIMAL	Cattle	69,000,000	1,518,000,000
	Sheep	62,000,000	170,000,000
	Raw Wool	287,000,000 lb.	90,000,000
	Hogs	65,000,000	239,000,000
	Horses and Mules	25,000,000	1,266,000,000
	Fisheries and Oysters	1,000,000 S.T.	59,000,000
MINERAL	Iron Ore (average)	30,000,000 L.T.	61,000,000
	Copper	308,000 L.T.	91,000,000
	Gold	3,900,000 oz.	80,000,000
	Silver (average)	56,000,000 oz.	32,000,000 ⁵
	Lead (average)	279,000 S.T.	24,000,000
	Zinc	158,000 S.T.	17,000,000
	Quicksilver	37,000 Flasks ⁶	1,600,000
	Coal	352,000,000 S.T.	485,000,000
	Coke	25,000,000 S.T.	66,000,000
	Petroleum	100,000,000 bbl. ⁷	94,000,000
	Cement	30,000,000 bbl. ⁸	32,000,000
	Salt (average)	21,000,000 bbl. ⁹	6,000,000
	Phosphate Rock	1,600,000 L.T.	5,000,000
MANUFACTURES	Woolen Manufactures		392,000,000
	Cotton Manufactures		339,000,000
	Silk Manufactures		92,000,000
	Pig Iron	18,000,000 L.T.	288,000,000
	Steel	14,500,000 L.T.	400,000,000
	Slaughtering and Meat Packing (Total Product)		786,000,000
	Lumber Manufactures		567,000,000
	Flour and Grist Mill (Total Product)		561,000,000
	Malt Liquors		237,000,000
	Distilled Liquors		97,000,000
	Wines		7,000,000
	Leather, Tanned		204,000,000
	Boots and Shoes (Factory Product)		261,000,000
	Butter (Total Product)	1,492,000,000 lb.	269,000,000
	Cheese (Total Product)	300,000,000 lb.	27,000,000
	Condensed Milk (Total Product)	187,000,000 lb.	12,000,000
	Clothing (Factory Product)		436,000,000
	Paper and Pulp		127,000,000
	Glass		57,000,000
	Pottery, Terra Cotta, and Fire-clay		96,000,000
	Jewelry		47,000,000
	Cigars and Cigarettes		160,000,000

¹ Exclusive of Porto Rico and Hawaii.² S.T. = 2000 lb. ³ L.T. = 2240 lb. ⁴ M. Feet B.M. = thousand feet board measure.⁵ This is the average bullion value of the silver; the coinage value is \$72,000,000.⁶ Flasks Merc. = 76.5 lb. ⁷ Bbl. Petroleum = 42 gal. ⁸ Bbl. Cement = 400 lb., or 380 lb. net.⁹ Bbl. Salt = 280 lb.

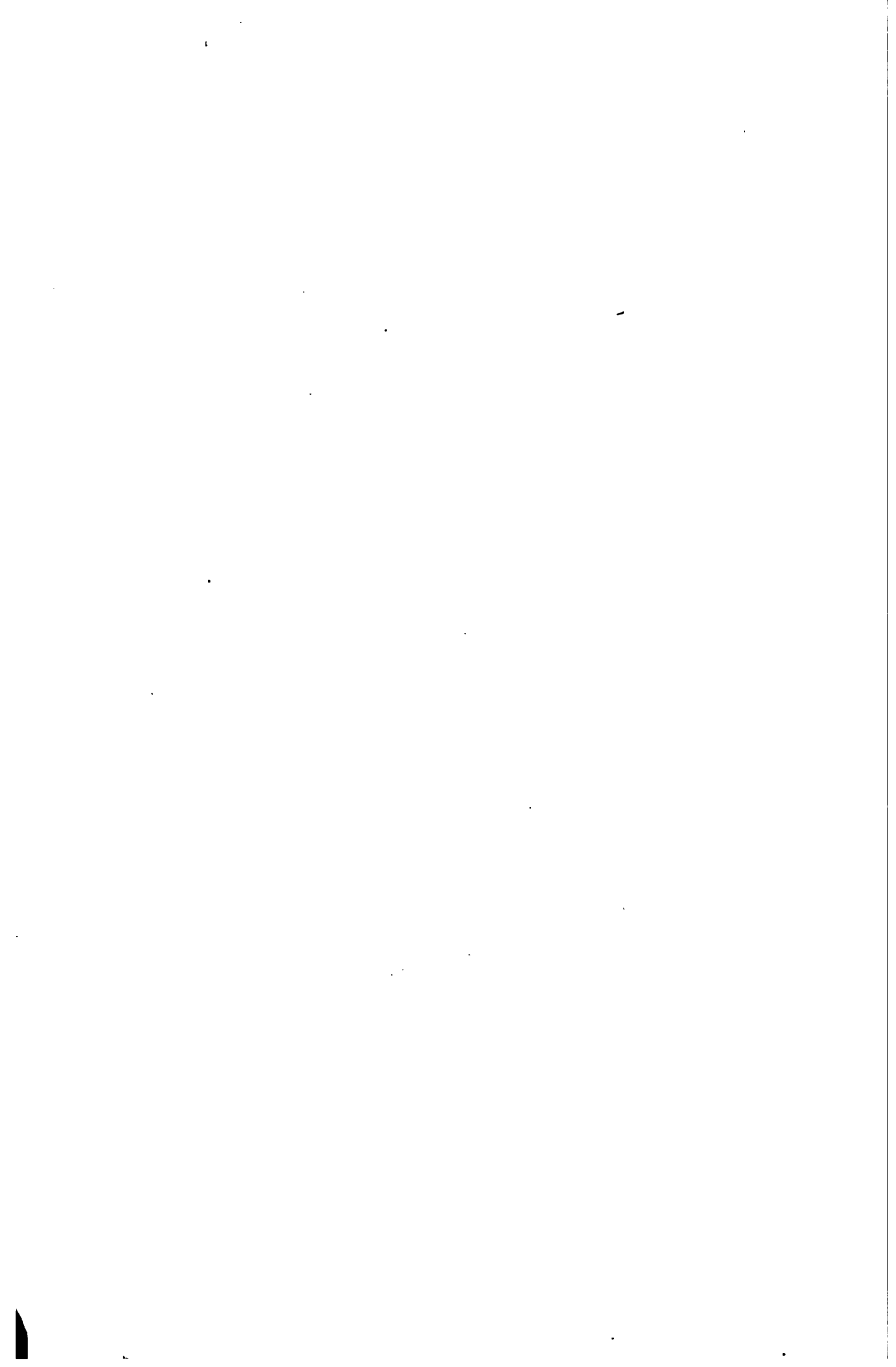
TABLE IV—VALUES OF FOREIGN COINS

Algeria	Franc	= \$.193
Argentina	Peso	= .965
Australia	Pound Sterling	= 4.8665
Austria-Hungary	Crown	= .203
Belgium ————	Franc ————	= .193
Bolivia	Boliviano	= .431
Brazil	Milreis	= .546
British West Indies	Pound	= 4.8665
Bulgaria	Lev	= .193
Canada ————	Dollar ————	= 1.000
Cape Colony	Pound	= 4.8665
Chile	Peso	= .365
China	Tael	= .661 to \$.719
Colombia	Dollar	= 1.000
Costa Rica ————	Colon ————	= .465
Cuba	Peso	= .910
Denmark	Crown	= .268
Dutch East Indies	Florin	= .402
Ecuador	Sucre	= .487
Egypt ————	Pound (100 Piasters)	= 4.943
Finland	Mark	= .193
France	Franc	= .193
Germany	Mark	= .238
Great Britain and Ireland	Pound Sterling	= 4.8665
Greece ————	Drachma ————	= .193
Guatemala	Peso	= .431
Haiti	Gourde	= .965
Honduras	Peso	= .431
India, British	Pound Sterling	= 4.8665
Italy ————	Rupee (16 Annas)	= .3244
Japan	Lira ————	= .193
Mexico	Yen	= .498
Netherlands	Dollar	= .50
Newfoundland	Florin	= .402
New Zealand ————	Dollar	= 1.014
Nicaragua	Pound Sterling	= 4.8665
Norway	Peso	= .431
Panama	Crown	= .268
Paraguay	Peso	= .431
Persia ————	Peso	= .965
Peru	Kran ————	= .079
Philippines	Sol	= .487
Porto Rico	Peso	= .50
Portugal	Dollar	= 1.00
Roumania	Milreis	= 1.08
Russia	Lev ————	= .193
Salvador	Ruble	= .515
Santo Domingo	Peso	= .431
Servia	Dollar	= 1.000
Spain ————	Dinar	= .193
Straits Settlements	Peseta ————	= .193
Sweden	Dollar	= .43
Switzerland	Crown	= .268
Tunis	Franc	= .193
Turkey ————	Franc	= .193
Uruguay	Piaster ————	= .044
Venezuela	Peso	= 1.034
	Bolivar	= .193

TABLE V—FOREIGN WEIGHTS AND MEASURES

METRIC SYSTEM				CAPACITY			
LENGTH		SQUARE MEASURE		WEIGHT		CAPACITY	
Meter	= 1.09 yd.	Acre	= .0247 acre	Kilogram	= 2.204 lb. Av.	Hectoliter (Liq.)	= 26.417 gal.
Kilometer	= .621 mi.	Hectare	= 2.47 acres	Quintal	= 220.4 lb. Av.	Hectoliter (Dry)	= 2.83 bu.
		Sq. Kilometer	= .386 sq. miles	Tonneau	= 2204 lb. Av.		
The metric system of weights and measures has been adopted in all the foreign countries mentioned in Table IV except the following:							
	LENGTH	U.S. EQUIV.	SQ. MEAS.	U.S. EQUIV.	WEIGHT	U.S. EQUIV.	CAPACITY
Cape Colony			Morgen	= 2.116 A.			{ Muid . . . = 3 bu. Leaguer . . . = 153 gal.
China			Ts'un	= 1.41 in.	{ Tael . . . = 1.33 oz. Catty . . . = 1.33 lb. Av.	Tou . . . = 1.13 gal.	
Cuba			{ Cordel . . . = 1 $\frac{1}{2}$ acre Caballeria = 33 $\frac{1}{4}$ acres				
Denmark			Dansk Mil. = 4.68 mi.	Geo. Sq. Mil. = 21.195 sq. mi.	Pund . . . = 1.102 lb. Av.	{ Tønde . . . = 3.9 bu. Pot . . . = .255 gal.	
Egypt			Pic = 22.83 in.	Feddian = 1.04 A	Oke = 2.75 lb. Av.		
Great Britain and Ireland ¹			Yard . . . = yard	Sq. Yd. . . = sq. yd.	Lb. Troy and Av. = lb. Troy and Av.	{ Bu. . . = 1.03 bu. Gal. . . = 1.2 gal.	
Greece			Pike . . . = .75 yd.		Ocque . . . = 2.84 lb. Av.	Baril . . . = 19.6 gal.	
India, British			Guz . . . = 36 in.		Mauud . . . = 84 lb. Av.	{ Candy . . . = 25.2 bu. Gallon . . . = 1.2 gal.	
Japan			Ri . . . = 2.4493 mi.	Sq. Ri. . . = 5.9559 sq. mi.	{ Kwan . . . = 8.2674 lb. Av. Kin . . . = 1.3228 lb. Av.	{ Koku . . . = 5.1 bu. Koku . . . = 47.6 gal.	
Persia			Guz Mokdsar = 36.5 in.		Miskal = 71 gr.	Artaba = 1.85 bu.	
Peru			Vara . . . = .927 yd.	Sq. Vara . . . = .835 sq. yd.	Libra . . . = 1.014 lb. Av.	{ Fanega . . . = 1.6 bu. Arroba . . . = 8.04 gal.	
Russia			Verste . . . = .663 mi.	Sq. Verste . . . = .44 sq. mi.	Pood . . . = 36 lb. Av.	{ Tchetvert = 5.94 bu. Vedro . . . = 3.24 gal.	
Santo Domingo					Quinal (4 Arrobes) = 100 lb.	Arrobs. . . = 4.9 gal.	
Straits Settlements			Yard . . . = yard	Acre . . . = acre	Catty . . . = 14 lb. Av.	Gantang . . . = 1.2 gal	

¹ Also Australia, British West Indies, Canada, Newfoundland, and New Zealand.



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¹ (d) = diagram.

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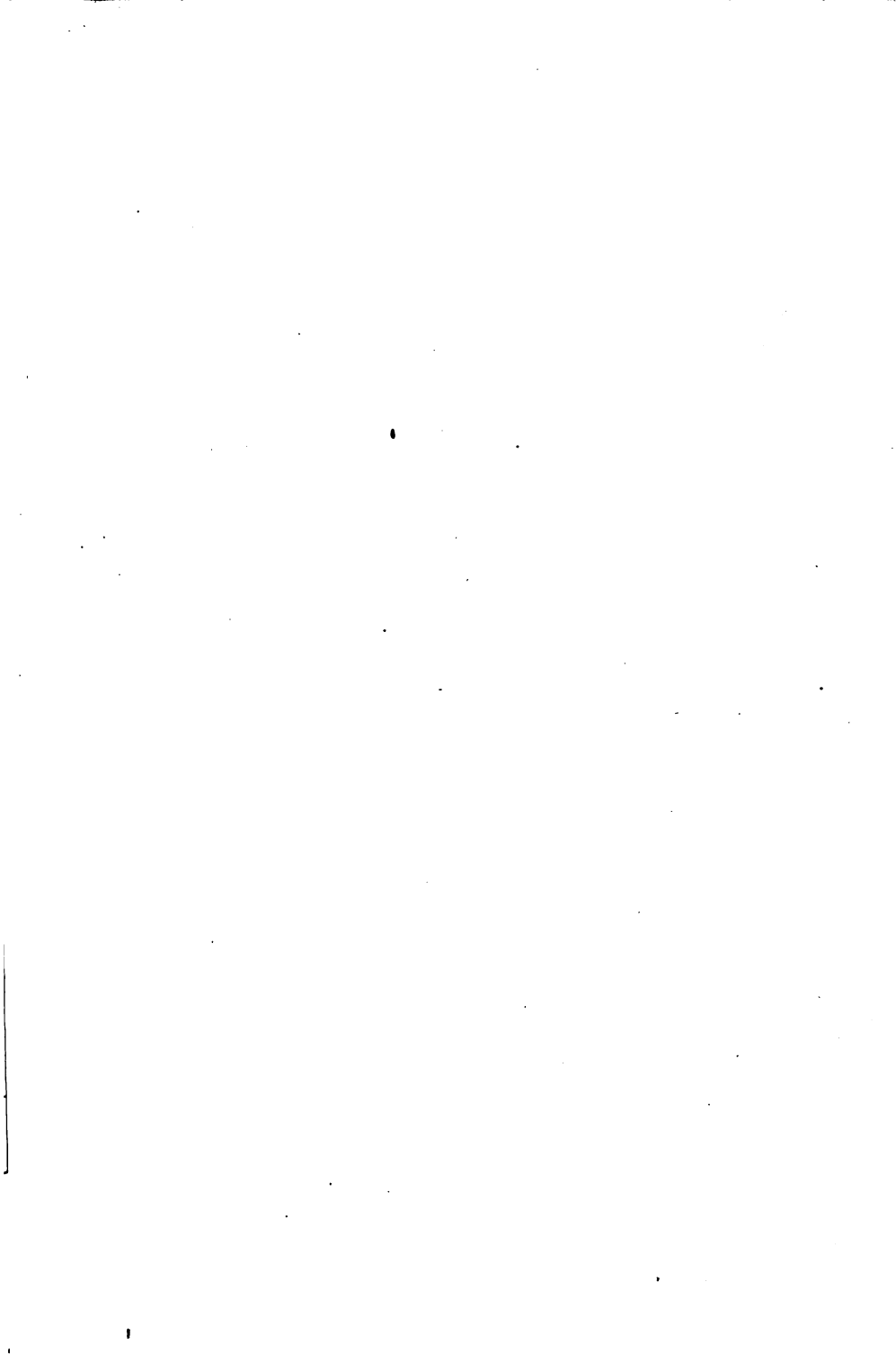
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